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Volume XVII JULY, 1934 Number 7

ROENTGENOLOGY IN DIAGNOSIS*

CHARLES G. SUTHERLAND, M.D.

Rochester, Minnesota

PERCY GHENT, in a brief biography of Roentgen, credits Abbé Jean Antoine Nollet, French physicist of peasant birth, with exhibiting a curious, ovoid contrivance of glass, which he called "the electric egg." It had been rarefied, more or less, by means of an air-pump and, energized by a static machine, a spark was made to leap across this egg-like device with a crackling sound. This discovery was made about the middle of the eighteenth century and almost a century elapsed without further recorded progress of great significance in this field of scientific research. Faraday, in 1837 and later, carried out researches in which he discovered the phenomenon of electromagnetic induction that made possible the production of electrical power as it is now known. His work marked the beginning of the long series of investigations that ultimately brought about the discovery of the x-ray. To Roentgen belongs the supreme honor of having first recognized the existence of this new, unseen, and mysterious radiation; the discovery had been made possible by the patient study and endless experiments of Faraday and the labors of Von Geuricke, Nollet, Plucker, Geissler, Gassiot, Hittorf, Morgan, Crookes, Thomson, Hertz, Lenard, and many other untiring trail-blazers of science. Ghent wrote: "A solitary worker in his simple laboratory in Wurzburg, on that historic Friday, the eighth day of November, 1895, his Crookes tube hidden beneath a light-proof shield of black cardboard and excited by a Ruhmkorff coil, he had observed, in the darkened room, the weird glow of that momentous scrap of paper coated with barium platino-cyanide, and made those investigations which gave to mankind, in that dramatic moment, a new degree of vision. And with a restraint almost superhuman, he devoted nearly two months to the intensive investigation of his great revelation before announcing it to the world." December 28, 1895, Roentgen read a paper before the Physicomedical Society at Wurzburg. It was modestly entitled "Concerning a new ray." That this discovery caught and fired the imagination of industry is evidenced by the statement of Herman Lemp, works engineer of the General Electric Company, that he was engaged from May, 1896, to March, 1897, in developing a suitable exciting service for x-rays, and that in the spring of 1897 his company had practically completed these various commercial sets. In 1900, a convocation of professional men interested in x-rays assembled in New York City and formed the American X-Ray Society, the forerunner of the present American Roentgen-Ray Society. In 1896, Becker made roentgenograms of the stomach and of a loop of intestine in a guinea pig, and in the following year Cannon studied the alimentary canal of cats by the aid of the fluoroscopic screen. In 1899, Williams and Cannon studied the alimentary tract of man by the fluoroscopic screen, and made roentgenograms of it in 1901. Much of the earlier American literature is concerned with the use of the x-ray as a therapeutic agent in malignant disease, but even before the opening of the present century, a few excellent articles were to be found, particularly in the German literature, on the subject of the x-ray in its relation to diagnosis of disease.

The greater development of the x-ray as an instrument in diagnosis has occurred in the pres-

*From the Section on Roentgenology, The Mayo Clinic, Rochester, Minnesota. Read before the meeting of the Southern Minnesota Medical Society, New Ulm, Minnesota, September 25, 1933.

ent century. This development has come as a result of improvements in machinery, the substitution of the film for the glass plate, improvements in the quality of the film emulsion to lessen the necessary time of exposure, the addition of the intensifying screen, the Potter-Bucky diaphragm, and the perfection of factors in technic, for much of which we are obligated to physicists, engineers, and research institutions of universities and of great manufacturing plants.

The roentgenogram is a reproduction of shadows created by the resistance of the structures of the body to the passage of the x-ray. The more resistant the structure to the ray, the less dense the shadow on the film, and, conversely, the less resistant the structure to the ray, the more dense the shadow cast on the film. The more compact bone of the cortex contrasts with the less compact bone of the medullary portions; the surrounding periosseous tissues cast shadows only by virtue of their bulk. This phenomenon offers two factors on which to base the interpretation of lesions in bone—changes in contour and alterations in density. These may occur singly or in combination; they may involve the bone and also the surrounding periosseous tissues. A prime requisite in interpretation is, of course, a knowledge of the normal and its range of variations. A mental picture of the gross changes, with an understanding of the histologic structure and the various changes in this in the varying stages of development in the individual types of lesion involving bone, aids materially in correlating the roentgenographic findings and establishing the diagnosis. In the interpretation of lesions of the thorax one is similarly concerned with contours and densities, contours of the pleura and diaphragm, the constituent structures of the mediastinum, and the alterations and distribution of densities in the hilum and the lung fields. In the study of the gastro-intestinal tract the introduction of a contrast medium is necessary to outline structures ordinarily non-resistant to the passage of the x-ray. Here the interpretation is made largely on alterations in normal contour of the structures, as outlined by the contrast medium.

Roentgenology has made possible the study of living pathology. To the pioneers in the observation of the characteristic changes in contour and alterations in density, seen separately or in combination, exhibited by given types of lesion, and their painstaking segregation of the plates and films depicting these, must go much of the credit for the rapid development of the science of roentgenology. The reproduction of these in publications has done much to widen the scope of the science and stimulate the interest of members of all branches of the profession, until roentgenology has become all but indispensable to them. With improvement in machinery, material and technic has come a quality of roentgenograms that has enabled study of the finest detail, with the result that the roentgenologist has become associated with the anatomist, the biochemist, the physiologist, and other workers in experimental fields. This has materially widened the scope of roentgenology in the study of disease and its demonstrable effects on the body. Contrast materials have been developed, which in the process of excretion have made visible the gallbladder, the genito-urinary tract, the liver and the spleen. Other materials have been injected into the maxillary sinuses and into the spinal canal. By removal of the cerebrospinal fluid and its replacement by air or gases the various structures of the brain have been visualized in their relation to one another, and by injections of air the conformations of the cranial cavity have been brought into relief. As a result of all these advances much has been added to the knowledge of the normal anatomy and physiology as well as the pathologic processes involving these various structures. Roentgenology, in experienced hands, is now recognized as the most rapid and the most accurate of all diagnostic methods in the fields in which it is applicable. Case aptly remarked: "It is too much to expect that any man can be a specialist in all the branches of medicine in which roentgenology plays a useful part." With this in mind the limitations of the individual method must be remembered. All too common are cases in which amputation or other surgical intervention has been advised largely or wholly on roentgenologic findings, in which careful correlation of the clinical and roentgenologic data, in some instances with biopsy, has reversed the decision and saved unnecessary mutilation of a patient. The diagnosis of a malignant lesion brings a severe mental shock to the patient, his relatives and friends. On the other hand, the misinterpretation of a malignant lesion as benign may rob a patient of the opportunity of appro-

priate treatment at the time when it offers the greatest promise of cure. Errors either way are not soon forgotten or forgiven. The ideal arrangement, therefore, is a consideration of all available clinical and laboratory data in the establishment of the final diagnosis.

From the standpoint of the patient it is almost enough that the roentgenologist shall properly decide whether there is a lesion. But increasing knowledge has made it possible to go farther than that. One can state that a given lesion is benign or malignant, that it is of a certain type of benignancy or malignancy, and thus materially assist in determining what therapeutic measures, if any, should be carried out in the individual case. The results of any method of treatment may be checked and recorded periodically, that all concerned may know of its efficiency or futility. If the lesion is of a malignant type, roentgenographic or roentgenoscopic examination may be made for evidences of secondary deposits (metastasis) in the lungs or other parts of the skeletal structure. The presence of metastasis may materially alter the prognosis and the method of treatment; in some cases it may save useless surgical intervention. This knowledge has come from the comparison of the roentgenogram with the gross pathologic specimen removed at operation or at necropsy, which has proved it to be a reproduction of the changes observed macroscopically and microscopically in various types of tissues. With certain reservations, it is possible to state that some of the features of these changes are pathognomonic. In this necessarily limited consideration of a broad subject it is my purpose to stress these in an attempt to establish foundations on which to build opinions.

Lesions involving bone and those involving the gastro-intestinal tract produce largely contour shadows in the roentgenogram. In both of these groups the contour is maintained throughout in the benign lesion; it may be irregular, it may be expanded or distorted, but it remains continuous. In malignant lesions there is a definite break in the contour, a sharp demarcation between the normal and the abnormal. When the contour is not visualized in the roentgenogram as such, the margins of the filling defect are smooth in the benign lesion and indefinite, serrated, or not discernible in the malignant lesion. In benign lesions of bone, where a tumor expands the cortex or encroaches on the surrounding periosseous tissues, the shadow of the tumor is definitely encapsulated, whereas in malignant lesions the invasion of the soft tissues is promiscuous, or at least indefinite; there is usually denuding of the cortex corresponding to the area of the tumefaction. Exceptions to this general rule will be mentioned in consideration of individual lesions.

As a rule benign lesions in the thorax involve the parenchymal portions of the lung fields; there is usually a zone of decreased density between the shadow of the hilum and that of the lesion, whereas in the greater number of malignant lesions they are continuous with and radiate from the shadow of the hilum. If there is effusion in the benign types, the heart and mediastinal structures will tend to be displaced from the affected side, to a degree varying with the amount of the effusion; in the malignant type there will be little if any displacement of the heart and mediastinal structures. A clinical note of import is that aspiration of benign effusions will yield a clear or straw-colored fluid, whereas those of malignant origin will yield bloody or blood stained fluid. Occasionally malignant cells can be isolated in the fluid or obtained from the point of the puncture needle.

A study of the site of the densities in lesions of the lung offers certain criteria which are helpful in the differential diagnosis. By arbitrarily dividing the lung fields these fields may be mentally divided into an inner and an outer segment, and then by horizontal lines into upper, middle and lower segments. With this mental picture various lesions can be assigned to selective situations with a fair degree of accuracy. The intensity of the shadow also offers some information. In the inflammatory lesions there is a tendency to deepening of the intensity of the shadow, whereas in the malignant lesions a translucent or hyalin appearance of the shadow predominates.

In the inner upper segment some accentuation of the linear markings is frequently observed. This does not transcend the median line; it is commonly a sequel of an acute respiratory infection and is seldom of any clinical significance. Tuberculosis, usually first apparent in the second interspace in the upper outer segment, may involve the first interspace and the apex. Certain roentgenologists will not make a diagnosis of tuberculosis without some evidence of the lesion

in this situation. Bacilli of tuberculosis may be found in the sputum of patients in whom shadows were noted only in the hilum or in the basal area. These are probably cases in which direct infection of the bronchus from breaking down of tuberculous nodes has occurred, but there is no roentgenologic evidence which can be considered reliable for the interpretation of tuberculosis. Extension of the lesion frequently distributes shadows over other than the areas mentioned, but in these the upper outer segment also is involved, and serves to corroborate the diagnosis. Tuberculosis with bronchiectasis is occasionally seen, and here again evidence of the lesion in the upper outer segment serves to designate tuberculosis as the primary infective factor. Two lesions having their base in the middle inner segment and radiating toward the upper or lower segment, are abscess and primary carcinoma of the bronchus. The abscess following extraction of teeth or tonsillectomy frequently radiates toward the middle or the lower segment. Occasionally the interval of decreased density of the hilum will not be sufficient to distinguish the abscess. Bronchoscopic examination, and securing tissue for microscopic examination if possible, may be necessary to define the diagnosis. Limited involvement of the bronchus by carcinoma may result in obstruction with marked emphysema, if the stoppage should be of the ball-valve variety, or atelectasis. Involvement of the pleura is not uncommon in carcinoma; secondary abscess or bronchiectasis may complicate the roentgenogram.

Bronchiectasis involves predominantly the lower inner segments, and the density of the shadow will vary as to whether the cavities are filled or empty at the time the examination is made. If the patient is placed for a time with the head down toward the feet an attack of coughing will often be excited which will empty the cavities and make them more apparent. It is an interesting clinical fact that hemorrhage is often a feature of tuberculosis, abscess, carcinoma of the bronchus and bronchiectasis; roentgenographic examination may be useful at times in eliciting the etiologic factor in pulmonary hemorrhage.

Among the lesions involving several segments and frequently bilateral are pneumonoconiosis (anthracotic type), miliary tuberculosis, pneumonoconiosis (silicotic type), the so-called non-tuberculous infections, which include spores, fungi, and organic matter observed in excessive amounts in certain occupations. It may be difficult to distinguish anthracosis from miliary tuberculosis; both exhibit a fine miliary infiltration of soft density, diffusely distributed over both lung more intense toward the bases, whereas the latter may appear more intense as it approaches the fields. The former may show a tendency to be apexes. Silicosis occurs most commonly in the middle segments, involving to a lesser degree the upper and sometimes the lower segments. The lesions have a tendency to become conglomerate, presenting irregular splashes of increased density. Nontuberculous infections present a variety of areas of much increased density depending on the specific etiologic factor. Bizarre patterns are not uncommon in this group. Primary carcinoma in the lung infrequently appears as a bilateral, diffuse infiltration of the lung fields in which heavy, coarse fibrosis is the roentgenologic feature. Metastatic involvement of the lung occasionally is seen as diffuse fibrotic infiltration. More commonly it occurs as multiple circumscribed nodules varying in size from a few millimeters to several centimeters, and, in certain cases, from myriads of minute shadows to a few nodules scattered through the lung fields. These nodules have a characteristic translucent density which with their definite circumscription can well be called pathognomonic of this lesion. Pulmonary fibrosis, general accentuation of the markings of the lung, is common among patients of advanced age, particularly those with a history of asthmatic bronchitis and emphysema of long standing, it is often observed among patients with cardiac lesions in which chronic passive congestion has been a sequel.

Lobar pneumonia is characterized by a homogeneous flat density, frequently well outlined on one margin by the interlobar pleural line. Bronchopneumonia is most commonly observed in the lower segments; it exhibits a coarse mottled shadow somewhat similar to that seen in bronchiectasis. In the lower segments it transcends the median line and involves the outer and the inner segments.

Pleural effusion is characterized by a homogeneous density, varying from a peripheral shadow demarcated by the outline of the visceral pleura bordering the lung which is compressed, to complete obliteration of the structure of the lung

by a dense, flat shadow. The same applies to empyema, which is invasion of the pleural cavity by a pyogenic infection. A roentgenogram made with the patient in a horizontal position is often useful in checking the presence or absence of fluid in the pleural caviety. Pneumothorax is characterized by an area of decreased density, in which no evidence of the structure of the lung remains. Careful inspection may be necessary to elicit the borders of the collapsed lung. Mediastinal tumors enlarge and otherwise distort the normal contour and relations of the heart and aorta. Fluoroscopic observation may be necessary to distinguish tumor from aneurysm. Aneurysm will be continuous with and inseparable from the shadow of the aorta. Pulsation will be observed in the majority of aneurysms; a well-organized clot in an aneurysm may largely inhibit this. Transmitted pulsation in some tumors may also be confusing. Substernal or intrathoracic thyroid glands will move up and down if the patient is asked to perform the act of swallowing while under observation. In the roentgenogram the margins of the aneurysm are usually smooth and regular, and careful study may elicit evidences of calcification in the wall. Margins of lymphomas or other mediastinal tumors are more often irregular, straightened or multilobulated. Occasionally tuberculosis of the cervical or dorsal portion of the spinal column with formation of a perivertebral abscess may simulate mediastinal tumor. Lateral and lateral oblique views made while using the Potter-Bucky diaphragm will rule out such lesions; they will also assist materially in accurate location of all other types of tumor.

In benign inflammatory lesions in which the bone is involved, periostitis should first be considered. Periostitis reveals a thin line separated from the underlying cortex of the bone by a thin shadow of decreased density, most commonly observed in the tibia and fibula in association with chronic ulcers of the leg. It is characterized roentgenographically by a smooth margined, wavy irregularity of contour. Syphilitic periostitis has a tendency to assume what has been designated a lace-work pattern, an intensely proliferative process. Osteitis involving the long bones is more commonly seen in the bones of the lower extremities, usually in the tibia. It may involve the anterior aspect of the bone and appear as a widely distributed thickening of the cortex, or it may be more localized, involve the entire circumference of the cortex, expanding it in an elliptical manner. The medullary cavity of the bone is always distinguishable in all forms of osteitis. When localized osteitis involves the femur, it cannot be distinguished roentgenographically from chronic nonsuppurating osteomyelitis of Garre. Osteitis involving the os calcis is usually part of a chronic low-grade type of infection. Syphilitic osteitis presents the predominant feature of sclerosis, often with irregularity or a fuzzy appearance of the cortical contour. Occasionally, probably due to gummatous involvement, the cortex will appear moth-eaten, with multiple small areas of lesser density distributed through the sclerotic areas. Marked widening of the diameter of the bone, with accentuation of the trabecular elements of the bone, may be present, giving it a striated appearance, similar to that seen in cases of osteitis deformans. Osteitis involving the pelvic bones will be considered later.

Osteomyelitis is shown roentgenographically as a greatly increased density of the bone, which includes the cortex and the medulla. In the first two weeks, on the average, the results of the reaction of the bone tissue to the infective agent will not have produced changes in the bone which are demonstrable in the roentgenogram. Later, small areas of decreased density will indicate suppuration and the formation of abscess. There is usually a concurrent periosteal proliferation, which in chronic cases may result in considerable expansion and irregularity of the contour of the bone. The laying down of new bone parallel to the shaft forms a thick layer on the outer margins of the bone, the involucrum. Sequestra are seen as portions of bone tissue lying free in an area of lesser density depicting necrosis and bone abscess. In tuberculous osteomyelitis, the evidences of reaction are absent in the surrounding tissues; marked destruction with little, if any, evidence of surrounding proliferation of bone is strongly suggestive of tuberculosis as the primary infective factor. A sclerotic type of increased density is characteristic of syphilitic osteomyelitis. As in syphilitic osteitis, multiple areas of decreased density scattered through the sclerotic shadow are seen in syphilitic osteomyelitis. I have seen a gumma in the upper end of the tibia that had the appearance of a giant cell tumor or fibrocystic disease.

Osteitis involving the bones of the pelvis is characterized by a loose mesh-work appearance of the bone, marked accentuation of the trabecular elements of the bone, actual enlargement of the bone, and occasionally formation of cyst. Part of the pathologic process is the subperiosteal deposition of bone tissue, so there is actual enlargement of the diameters of the contour of the bone, best seen in the head, the femurs, the tibias and the ischium. I have seen cases in which osteitis involved the whole or part of one os innominatum. In some cases, the age of the patient, the character of the lesion and the absence of clinical data to explain it leads to the interpretation of early osteitis deformans. In other cases, a sclerotic type of density among women with a history of one or more miscarriages leads to the conclusion that syphilis was probably the etiologic factor. Localized areas in another case were evidently metastatic infectious processes secondary to a pyogenic infection elsewhere. In another case, dense sclerosis of all bones was a part of a generalized osteitis sclerotica (marble bone). Trauma, particularly of an oft repeated occupational type, may have been a factor in some cases; in others there was no clinical explanation.

Osteitis deformans (Paget's disease) may involve the entire skeleton with the head, shafts of the femurs, tibias and pelvic bones exhibiting the characteristic changes. The distinction between osteoplastic metastasis secondary to carcinoma of the prostate gland and osteitis deformans sometimes presents difficulties. The roentgenographic picture of carcinomatous metastasis of the osteoplastic type gives a coarsely granular type of density, in which the trabecular elements of the bone are obliterated; if any background is apparent it is of destruction of bone. There is no enlargement of the bone shadow. In case of doubt, roentgenograms should be made showing the heads of the femurs, the ischium and upper third of the shafts of the femur; the differential points enumerated are well exhibited in these parts. Roentgenograms of the head of the femur, of the tibia and of the shafts of the femurs should be made, to corroborate the diagnosis of osteitis deformans.

Osteitis fibrosa cystica, fibrocystic disease, and von Recklinghausen's disease, all showing varying degrees of lessened density in the bones, have been considered by observers as having their origin in disorders of the parathyroid and other ductless glands. Experimental work has proved that the parathyroid glands have a direct relation to calcium metabolism, and clinically the presence of parathyroid tumors has resulted in extreme degrees of osteoporosis in bone, the calcium lost from the bone being deposited in other tissues of the body. Removal of the tumors or appropriate treatment of the parathyroid disorders has resulted in restoration of calcium to bone and a diminution of the calcium content of the other tissues. The tendency to formation of cyst common to this group is also seen in osteitis deformans, and it has been suggested that this disease is probably traceable to some defect in the parathyroid and the suprarenal glands. Pathologists long ago accepted the association of this group of lesions, and clinical and experimental observations now being made will probably bear out their contention.

Metastatic malignant lesions in bone are seen in two forms, the osteoclastic, or destructive, and the osteoplastic, or proliferative. The term "melted ice" very aptly describes the osteoclastic form. If one can visualize the skeleton as being formed of ice, the lesions resemble more than anything else the results of a stream of heat against the structure. In the long bones, there is abrupt dissolution of the cortical contour, and a section seems to have been literally melted out of the bone. Similar lesions are occasionally seen involving the vertebræ. In the pelvic bones, filling defects of varying size show serrated or entirely obliterated margins. Extensive involvement of almost the entire skeleton is not uncommon in lesions secondary to carcinoma of the breast. The osteoplastic form is characterized by a generalized increased density of the bone shadow. In the majority of cases, proliferation keeps pace with destruction; in others, areas of destruction of bone are apparent with splashes of increased density scattered throughout the bone. The lesion often first involves the inner margin of the ilium along the sacro-iliac synchondrosis and may involve the whole of one pelvic bone before spreading to other parts of the skeleton. In the advanced cases it may involve almost the entire skeleton. The characteristics of density of bone have already been described in the consideration of the distinction between carcinomatous osteitis and osteitis deformans.

Benign osteogenic tumors of bone occur among

patients in the earlier decades of life. Their characteristic of retaining an intact contour has already been mentioned. Distinction of the various types depends on the preponderant tissue of the tumor; chondromas are composed largely of cartilage, which offers little if any resistance to the roentgen ray; fibrous tissue offers slight resistance, and bone tissue offers the maximal amount. Exostosis and osteochondromas cast varying shadows of a cauliflower type, depending on the content of cartilage and bone in the tumor. Exostosis may have a broad base or be attached to the bone by a narrow pedicle. Osteomas cast shadows of extreme density owing to the preponderance of bone cells in them. Giant cell tumors occur characteristically in the epiphyses of long bones of persons aged from sixteen to thirty-five years. As a rule they appear as a solitary tumor. They are most often found in the lower end of the femur and the upper end of the tibia and fibula, less frequently in the lower end of the radius and ulna, humerus, os calcis, ilium, clavicle and the phalanges. They may also involve the jaw and the spine. The tumors contain immature cells and belong to the connective tissue group. The typical roentgenographic picture of giant cell tumor is that of expansion of the cortex, with multiple trabeculæ over a field completely lacking in density. The shell of bone may be gradually thinned, the trabeculæ may be lost, pathologic fracture may occur in the thin shell, there may be a break in the continuity of the contour as a result of the disappearance of the shell over the greater area of the tumor. They may be distinguished from malignant tumors by a thin wave of bone tissue extending over the tumor, and careful study will elicit a shadow of the smooth margined soft tissue in the periosseous soft tissues. These tumors recur frequently after curettement; malignant changes in them have been reported. At present radiotherapy seems to be the most effective treatment.

Cysts of bone are usually single; they may result from hemorrhage into the bone with absorption of the contents, the result of trauma, or as a sequel to isolated infected emboli. They appear as smooth-margined filling defects in the substance of the bone. Thorough curettement, with removal of the lining membrane, swabbing with some escharotic solution, and filling with bone chips is usually successful in their obliteration.

Osteogenic sarcoma presents the characteristics of malignant tumor in bone. It exhibits most vividly the sharp demarcation of the normal from the abnormal, the elevation of the periosteum at the margin of the tumor and denuding of the cortex over the area of tumefaction. It is most common in early adult life; predominant in the second decade. The metaphysis is the seat of predilection; it rarely, if ever, begins in the epiphysis. Most of the tumors occur in the bones around the knee joint; a small percentage occur in the humerus and the bones of the shoulder girdle, and in the bones of the pelvis. The old types can still be distinguished roentgenographically: the periosteal type, with its sun-ray radiation of bony spicules at right angles to the shaft, into the periosseous tissues; the medullary type, with its area of destruction in the bone and promiscuous invasion of the periosseous soft tissues; and the sclerotic type, which is shown as a dense area expanding the contour of the bone, and is sometimes difficult to distinguish from syphilitic osteitis. The prognosis in osteogenic sarcoma is grave; amputation offers the only hope of cure; examination for metastatic involvement should always be made before this is undertaken. Irradiation has had little success in the treatment of sarcoma; it is occasionally used as a therapeutic test in distinguishing between sarcoma and hemangio-endothelioma.

Hemangio-endothelioma (Ewing's tumor) commonly affects persons in the first and second decades of life, it is rarely seen in the third and fourth decades. Its site of predilection is the long bones, usually in the shaft and rarely in the ends. The tibia, fibula, humerus, ulna, femur, small bones of the extremities and the skull are most frequently involved, and it is not uncommon in the clavicle, ribs and vertebræ. It is believed to have its origin in the perivascular or lymphatic endothelium. The medullary cavity is frequently extensively involved and the tumor appears to begin simultaneously in numerous areas in the bone marrow, filling the medullary cavity as well as the larger haversian canals. These diffusely disseminated multiple foci enlarge rapidly, become confluent and expand in all directions. The tumor may liquefy and resemble osteomyelitis grossly. A concurrent periosteal defense reaction is stimulated and successive lay-

ers of newly formed bone may be laid down parallel to the shaft, resulting in an elliptical tumor with an onion-like series of layers considered pathognomonic of this disease. Metastasis occurs early and practically always in bone, particularly in the skull. Visceral metastasis may occur, but it is not common. Hemangio-endothelioma is particularly amenable to the action of roentgen rays or radium; this is significant in differential diagnosis.

Angiosarcoma may be classified roentgenographically and therapeutically as hemangio-endothelioma. It is characterized by extensive proliferation of the bony tissue, and marked hypertrophy of the periosseous soft tissues.

Myeloma is a disease affecting patients in the fourth to seventh decade of life; it usually occurs in the fifth decade. The short bones are often affected, particularly the ribs, sternum, vertebræ and skull. In the long bones it affects the mid-portion rather than the end. Osseous involvement may be diffuse. Myelomas are usually multiple, ranging in size from 1 mm. to 4 cm. The tumors are thought to have their origin in the hemopoietic cells of the bone marrow, being composed of plasma cells or their derivatives. Bence-Jones, in 1847, reported the presence of a peculiar protein in the urine in cases of osteomalacia; this has been found since in a large percentage of cases of myeloma and is regarded as of diagnostic import. Roentgenographically, myeloma violates all rules for the diagnosis of malignant tumors of bone. In the skull, the ribs and the vertebræ and bones of the pelvis it is characterized by multiple, small, smooth-margined areas that have the appearance of having been made by a metal punch. Similar areas are seen in the long bones. In other cases the ribs and the long bones reveal expansion of the cortex and multiple trabeculations not unlike those seen in giant cell tumor. In the latter group, biopsy has proved them to be myeloma. The prognosis in myeloma is hopeless; the lesion may recede rapidly under irradiation, but permanent recovery by this method has not been recorded. The average duration of the disease is one to two years. In diffuse involvement of the skeletal structure, myeloma may be difficult to distinguish from the osteoclastic form of metastatic carcinoma, but, as the end-result is the same in both forms, this is not a serious error.

In the diagnosis of lesions involving the stomach and small intestine, roentgenoscopy has proved to be the most rapid and most accurate method. Examination with the aid of the fluoroscopic screen allows the patient to be turned to any desired angle, in the vertical or the horizontal plane, and palpatory manipulation synchronous with ingestion of the contrast medium allows approximation of the walls and detection of lesions that might easily be masked in roentgenographic examination alone. Such examination eliminates mistaking for lesions, pseudofilling defects and pseudoniches and incisuras, by demonstrating persistence of the evidence at all angles and in all planes in repeated visualizations under palpatory manipulation. Roentgenograms are made to verify the roentgenoscopic findings, and to provide tangible evidence of the lesion in a permanent record. Comparison of roentgenographic with roentgenoscopic findings over a number of years in large series of cases has proved conclusively the fallibility of the roentgenographic method alone. Interpretation is based on changes in the contour of the outlined viscus, technically expressed in the terms "filling defect," "niche," "incisura" and "deformity." These are the direct signs. Additional information is supplied by alterations in the functions, seen as hyperperistalsis, hypoperistalsis, hypertonicity, hypotonicity, rapid or delayed emptying time, and other indirect signs.

Diverticulum of the esophagus is characterized by a smooth-margined dilatation of varying size, which has the pathognomonic feature of emptying from the top. With the patient turned to the required angle, the contrast substance will be seen to spill over and to run parallel to the expanded shadow, around and below the diverticulum. Cardiospasm usually involves the esophagus at or near the cardiac orifice of the stomach, and causes a smooth-margined dilatation which empties through a narrow constriction at its lower extremity. Stricture presents smooth-margined narrowing and tortuosity of the esophagus, emptying at its lower extremity. Carcinoma exhibits the characteristic sharp demarcation between the normal and the abnormal, with keen-edged irregularity of the contour below this, terminating in marked constriction. Careful observation of the contrast substance as it passes from the esophagus to the stomach, discloses the opaque material passing along the lesser curvature to the angle and the pylorus in

a comparatively straight line. Deviation of the stream of the opaque substance should arouse suspicion of carcinoma of the cardiac end of the stomach, and examination of the patient in the prone and in the supine positions on the horizontal table will corroborate this finding when the lesion is present. Emptying of the esophagus above the normal level, or deviation of the lower part of the esophagus, suggests the possibility of the congenital form of diaphragmatic hernia. Examination of the patient on the horizontal table, in an inverted position, will assist in visualizing such a lesion if present.

The pathognomonic sign of benign ulcer in the gastric wall is a smooth-margined projection from the contour, usually along the lesser curvature, continuous with the contour throughout. This is called the niche and is a reproduction of the barium-filled crater of the ulcer. Rarely a shadow is seen beyond the contour, usually with an hour-glass contraction of the stomach on the greater curvature opposite. This is a perforated ulcer with an accessory pocket in some of the surrounding tissues or structures. Accompanying ulcers of the lesser curvature, often there is associated prepyloric narrowing, the rugæ of the stomach have a tendency to converge on the site of the ulcer and an incisura of varying depth is apparent in the greater curvature opposite the lesion; in some cases it is so deep as to cause hour-glass deformity of the stomach.

Carcinomatous ulcer may be indistinguishable from benign ulcer, but usually the crater of a carcinomatous ulcer is wider in diameter, has less tendency to project from the contour, and on palpation, in many cases, a large, flat crater will be revealed, with a surrounding zone of lightened density sharply demarcated at its margins, the "meniscus" ulcer of Carman.

Carcinoma of the stomach appears generally as a definite break in the contour, below which is a filling defect of varying dimensions. There is a polypoid type, in which filling defects are apparent, due to the displacement of the contrast substance by large masses of tumor, and there is an infiltrative type in which the walls of the stomach are stiffened and straightened out until in some cases the stomach is converted into a narrow tube through which the opaque substance passes quickly into the duodenum and small intestine.

The infiltrative type may be difficult to distinguish from syphilis of the stomach, which also is a diffusely infiltrative process. Syphilis fails to give the definite demarcation; the filling defect is smooth-margined in contradistinction to the keen-edged appearance of carcinoma, and the termination of the lesion in carcinoma tends to be a sharp point, whereas in syphilis it tends to be more globular. A clinical note of value is that in syphilis the general well-being of the patient is inconsistent with the extent of the involvement of the stomach. In doubtful cases the therapeutic test may be necessary to decide the diagnosis.

In benign tumors of the stomach the continuity of the contour of the stomach will be retained at all angles and in any position and the filling defect will tend to be smooth-margined throughout. Polypoid carcinoma may retain the roentgenologic characteristics of benign tumor throughout the examination. Extrinsic tumors may project into the lumen of the stomach and produce a smooth-margined filling defect that may be difficult to distinguish from that of a benign, intrinsic tumor.

Benign or malignant lesions involving the pylorus and antrum frequently cause obstruction and retention. The same phenomenon may result from extensive cicatrization and narrowing of the duodenum. By placing the patient in the prone position on the horizontal table, slightly on the right side, for from a few minutes to an hour, emptying will become established, the contour of the antrum and pylorus can be visualized and peristalsis studied. An intact contour, with peristalsis passing to the pyloric ring, will indicate that the lesion is on the duodenal side of the pyloric ring. If the lesion is on the gastric side, the type of deformity usually will indicate the type of lesion involving it.

Duodenal ulcer is characterized by deformity of the duodenal cap; an incisura indents the contour of the cap. The deformity predominantly involves the first 3 cm. beyond the pylorus; it may be a narrow, straight-edged filling defect that may be unilateral or bilateral, so shallow as to be difficult of detection, or it may be deep enough practically to bisect the cap. Extensive cicatrization may produce many bizarre patterns, and pouching resulting from this may be misconstrued as diverticula. True diverticula occur in the region of the ampulla of Vater. There is frequently marked shortening of the first portion of the duodenum, and in a definite proportion of

ulcers approximation of the walls will elicit a niche, which indicates the barium-filled crater of the ulcer. The cap may be involved by diffuse duodenitis, with edematous thickening of the walls. In some cases this may produce the characteristic deformity, but in others a rapidly emptying cap of irregular outline may best be typified by the term "irritable." Lesions of the small intestine are of rare occurrence, and sometimes are difficult to elicit by the roentgenoscopic method. The best method is to have the patient ingest a barium meal, and to make frequent observations over a period of one hour.

Lesions of the large intestine are most satisfactorily studied by rectal injection of the contrast medium under fluoroscopic control, with palpatory manipulation of the intestine synchronously with the advance of the medium toward the cecum. In early chronic ulcerative colitis the evidence may be entirely in the rectum; roentgenoscopy has some advantages over proctoscopy when eliciting this evidence, otherwise proctoscopy is preferable in the examination for lesions of the rectum.

Carcinoma is the lesion of the colon most commonly encountered. Any portion of the large intestine may be involved. As in the stomach, three types may be present: the scirrhous or fibrous type, characterized roentgenologically by the napkin ring filling defect, sharp demarcation at both extremities with a narrow fibrous connecting strand; the polypoid type, in which lobulated, cauliflower-like masses project into the lumen and displace the contrast medium by a mottled shadow of lesser density; and the mucoid type, which also reveals the sharply defined dissolution of the contour at each extremity with irregularity and narrowing somewhat similar to that of the scirrhous type, but of greater length and less definition. This type will frequently coincide in situation with a palpable mass. Diverticula are often seen as small lobulations projecting from the margin of the contour. Diverticulitis is confined to the sigmoid colon, and appears as a spindle-shaped shadow, the contours of which are serrated on account of the associated spasm and an inflammatory condition of the wall.

Ulcerative colitis is seen in three types: the diplostreptococcic type, ordinarily termed chronic ulcerative colitis; tuberculous type; and amebic type. Chronic ulcerative colitis commences in the rectum and involves the colon progressively toward the cecum as a diffuse symmetric narrowing of the intestine and diminished mobility and flexibility. The haustral markings are completely obliterated, the colon is definitely shortened, and the splenic and hepatic flexures have disappeared. The contours may appear uneven, fringed or feathery, owing to extensive destruction of the mucosa, or appear mottled as the result of extensive, diffuse polyposis. In the early stages, the only roentgenologic evidence of the lesion might be local or generalized increase in the intestinal motility expressed as hyperirritability of the colon.

Tuberculous ulcerative colitis commonly involves the ilecocecal area, near the ileocecal valve, or the cecum and proximal segments of the colon. Roentgenologically, the features are narrowing, hyperirritability and obliteration of mucosal relief with shortening of the segment. The shadow tends to be ragged, with irregularly arranged jagged prominences and depressions. Hyperplastic tuberculosis is often primary in the intestine, is definitely a tumefactive, granulomatous process, and is confined to a relatively short portion of the intestine, usually the ileocecal coil, and is formative rather than destructive. It should be distinguished from neoplastic and other forms of granulomatous involvement rather than from any of the types of chronic ulcerative colitis.

Amebic colitis most commonly involves the cecum and proximal segments of the colon; secondary sites of preference are dependent portions of the intestine. The ileum is practically never involved, though the cecal aspect of the ileocecal valve is often involved; this results in a gaping orifice due to stiffening of its lips. Obliteration of the haustral markings, shortening and narrowing, sometimes almost to complete closing of the lumen, have been constant in the cecal segment. Slight manipulation of the ileocecal coil when moderate distention of the cecum is present will usually result in a reflux into the terminal portion of the ileum. The roentgenologic aspect of amebic colitis is one of diminished intensity and severity in comparison with that of the other types of chronic ulcerative colitis.

Polypoid lesions of the colon include all sessile or pedunculated growths projecting into the intestinal lumen. The early diagnosis and removal of these is important because of the known ten-

dency to the development of malignant characteristics. Their site of predilection is the rectum and distal segments of the colon. Roentgenologically, they are distinguishable by characteristic mottling produced by multiple central filling defects, the result of the displacement of the contrast medium by the polypoid projections. Their recognition has been materially aided by the adoption of the double contrast method first introduced by Fischer and developed in this country by Weber. Thoroughly efficient preparation is a prerequisite to success with this method. After examination by the opaque enema, the patient is allowed to evacuate the enema and air is introduced under roentgenoscopic control. Enough of the contrast medium will have adhered to the walls of the colon to afford visualization of its intraluminal appearance and bring into bold relief the outlines of the polypoid masses. Stereoscopic roentgenograms of these masses afford excellent opportunity for study. In most lesions of the colon this double contrast method seems to offer a real advance in visualization, and reproductions of these roentgenograms for publication have a quality of detail equal to the finest drawings.

A consideration of the diagnosis of gastrointestinal lesions would not be complete without some reference to cholecystography in the visualization of pathologic change in the gallbladder and gallstones. The oral administration of the dye at The Mayo Clinic has been satisfactory from every angle. Sodium salt of tetraiodophenolphthalein 4 gm., freshly dissolved in 30 c.c. of distilled water, mixed with one glass of grape juice, orange juice, or carbonated mineral water, is taken immediately after a meal at the usual hour in the evening. This meal should be substantial, reasonably free of fats, and fats should be withheld subsequently until the gallbladder has had opportunity to fill with dye-laden bile and to concentrate it. During the period of the examination, the patient should not take purgatives or any medicines which affect the digestive tract. Breakfast is not allowed, but water, black coffee or clear tea is permissible. The first set of roentgenograms is made at 8 a. m. and the second set at 10 a. m. The patient is then instructed to take the usual noon meal, but to include with it a glass of milk and cream in equal parts, and return for the third set of roentgenograms at 1 to 2 p. m. Painstaking technic, particularly in the avoidance of movements, is a prime requisite. The roentgenographic formula is proportioned to the patient's thickness by measurement. A target-film distance varying from 29 to 25 inches, a kilovoltage from 70 to 95, and an exposure time from half to one second are employed with a standard milliamperage of 80 and a flat Potter-Bucky diaphragm. Complete filling of the gallbladder in the first series, with deepening of the density in the second series and marked shrinking of the volume of the shadow in the third series is interpreted as a normally functioning organ. If there is a uniform lack of density throughout in the visualized shadow of the gallbladder with lessened shrinking of the volume, the organ is reported as poorly functioning. The gallbladder may be visualized as a faint shadow that is of uniform size and density in the films of all series; subsequent examination without administration of dye may prove this to be a nonfunctioning gallbladder with retention or thickness and sometimes calcification in the wall, the primary shadow of the diseased gallbladder. With good visualization of the margin of the liver, the kidney and of the psoas muscle, and with no evidence of a shadow in the gallbladder after administration of the dye and assurance that the patient has followed all instructions, the evidence is interpreted that the gallbladder is nonfunctioning. Gallstones of sufficient size and calcium content can be visualized as often as they were before the advent of the dye. Cholesterin stones of size sufficient to occlude the dye will be visible as negative shadows, areas of decreased density in the homogenous flat density cast by the dye-filled gallbladder. In such cases, the findings are reported as normally functioning, poorly functioning or nonfunctioning gallbladder with stones. Gas in the intestine overlying the gallbladder may simulate negative shadows closely, or may mask the evidence of stones in others. Extraneous shadows, particularly small areas of calcification in the cartilage of the ribs may offer difficulties in interpretation. Further examination is indicated in all such cases. Kirklin, in a considerable number of cases, has been able to distinguish between negative shadows cast by stones and neoplasms of the gallbladder, particularly papillomas, adenomas, fibromas and myomas. Correlation of the cholecystographic observations with the findings in all cases in which operation is performed has established the fact

that lack of appearance of the shadow of the gallbladder is the most accurate of all the findings; that in experienced hands the interpretation of a poorly functioning gallbladder is accurate to a high degree of efficiency, and that of a normally functioning gallbladder is the least accurate from the comparative standpoint, but still infinitely more reliable than any other method known.

I shall not consider here the part played by excretion urography in the delineation of the changes in the normal anatomy and physiology of the genito-urinary tract the result of inflammatory or neoplastic diseases. With these changes, as with those involving the brain, spinal cord, maxillary sinuses, mastoid processes, face, jaw and neck, the roentgenologist is associated with the specialist to whom the general practitioner generally assigns such cases. In this brief summary of what has been accomplished in the development of roentgenology in a little more than three decades, I have perhaps stressed its utility without emphasizing as I should its limitations. In experienced hands roentgenology is without doubt the most accurate and most rapid diagnostic method in cases in which it is applicable. But it will always be subject to the same differences of opinion in interpretation as has been that of macroscopic and microscopic visualization of pathologic changes. Correlation of the roentgenologic with the clinical and laboratory findings is therefore imperative when establishing the final diagnosis. In cases in which differences of opinion arise, the patient should always be given the benefit of the doubt.

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THE DIAGNOSIS AND TREATMENT OF HAY FEVER WITH ESPECIAL REFERENCE TO MINNESOTA*

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EXCEPTING for the complete avoidance of the pollens responsible for hay fever symptoms by sojourning in an area free of the plants that produce them during the period of flowering, the method of giving prophylactic injections of pollen extract offers the best means of any thus far advanced for the preventive treatment of hay fever. Some are more successful with this method than others, and, considering the amount of detail involved in its correct and scientific application, it would indeed be strange were it otherwise. The degree of success attained by those who use the method will depend upon the extent to which recognition is given to two cardinal principles of *specific* and *adequate* treatment.

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The first principle involves a *correct* and *complete* diagnosis of each case on the basis of the etiological pollen or pollens. The second principle implies that, the etiological agents having been discovered, an adequate amount of the extracts of these be given to afford relief.

Before attempting the procedure of specific diagnosis it is obviously necessary to acquire a knowledge of the plants that cause hay fever in the environment of the patient. In addition it is imperative to have knowledge of the flowering period of the plants, since it is only at this time that pollen is shed. This information and a small supply of the dried pollens known to be causes of hay fever constitute the essentials of the armamentarium necessary for the diagnosis of the specific causes.

The Diagnosis

Even when one has become thoroughly familiar with the causes of hay fever, the determination of the specific pollen or pollens responsible for the illness of an individual is by no means simple. While correct conclusions may as a rule be reached in the majority of cases by the physician well versed in the hay fever plants of his own region, it is a fact, nevertheless, that such conclusions are always or at least nearly always based upon evidence that is circumstantial. *A positive skin test to a particular pollen does not establish this pollen as an etiological agent of the hay fever condition of the patient upon whom the test was made.* It must be shown, in addition, that the pollen which evokes the reaction is shed at the period during which symptoms occur.

In a previous publication[3] we have listed the hay-fever-causing plants for Minnesota, together with the dates of pollination and information concerning the distribution of some of the more important species. One hundred and seventy-four species listed all play some part in the causation of hay fever, albeit they are not of equal importance. It is unsafe, at the present state of our knowledge, to pick out a few species as the most important causes, with a total disregard of the others. However, to consider each of these as separate and distinct causes would make the diagnostic procedure not only extremely tedious, but would render the problem of treatment very difficult. Fortunately there are certain group relationships among the plants which serve to simplify the problem. There is considerable overlapping of antigenic properties between related species and genera. When, for example, a positive reaction to common ragweed is obtained, the patient invariably reacts to some close relatives, and in our experience almost universally to the giant ragweed, western ragweed, marsh elder, and usually to cocklebur. Although the latter two are sufficiently distinct from the ragweeds and from each other to constitute separate genera, yet their pollens apparently contain a common excitant.

Similar results are obtained with other groups of related plants. Grass-sensitive patients invariably react to many kinds of grasses, and, similarly, a patient sensitive to the pollen of one species of oak reacts to many, probably all kinds of oaks. These results clearly indicate that species sufficiently related to constitute a group of the rank of genus possess a common excitant, and it has been shown in many cases that the exciting agent is common to the larger categories of tribes and even families. Whether, in addition to this common excitant, specific differences also exist is still an open question, and one concerning which there are almost as many opinions as there are investigators. Much work remains to be done before this question can be answered. The immunological overlapping between species and genera clearly warrants attempts to simplify the problem by the method of grouping related species. Ellis and Rosendahl,[3] for the purpose of investigation, arranged the 175 species included in their survey into twenty-four groups. Nine of these groups represent subdivisions (tribes) of the grass family and, as might be expected, much immunological overlapping occurs between these groups. From a practical standpoint while we await more definite information on the question of specificities among the grasses, these subdivisions of the grass family may as well be condensed into one. This reduces the total number of groups to sixteen. Chart 1 (adapted from Dahl[2]) shows the composite pollinating period of the respective groups. An attempt is made to give an idea of the quantity of pollen in the air in relation to season, by giving width as well as length to the line representing the pollinating season. The reader is referred to the paper cited above for detailed information concerning the components of the various groups.

By comparing the period at which symptoms occur in a given patient with Chart 1, one may arrive at a knowledge of the possible causes.

Suppose the symptoms as stated by the patient begin in March and end with frost. Obviously one is obliged to consider as a possible cause all groups of which there are representatives in the flora of the region where the patient resides, and we have found, by actual determination of the atmospheric content of ragweed pollen, that patients sensitive to ragweed do not uniformly have symptoms during the first days of August, when the amount of pollen in the air is greater than in

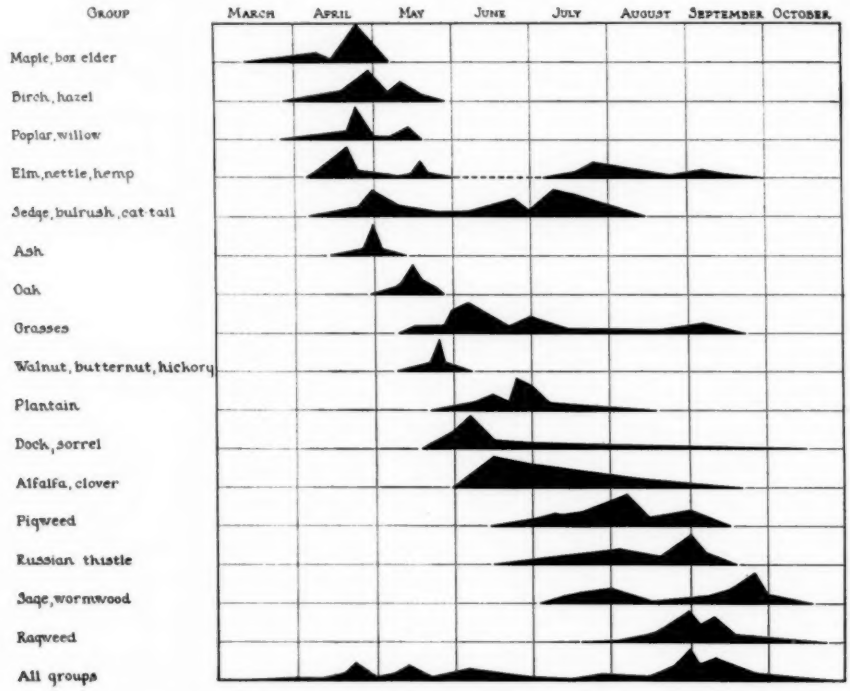


CHART I. DURATION OF POLLINATION TOGETHER WITH TIME OF GREATEST POLLEN PRODUCTION OF EACH GROUP

routine testing must be done with these groups. If the symptoms begin at a later date, let us say August 1, it might seem unnecessary to test for sensitivity to those pollens which make their appearance at an earlier date. Such reasoning is erroneous and leads to many failures in treatment. If we consult Chart 1 we find that the ragweed group begins pollination near August 1 and ends about the middle of October, which is the average date of frost. If now we find by skin tests that the patient is sensitive to the ragweed group we are by no means justified in concluding that it is the sole cause of his hay fever, for the chart also shows that several other groups are shedding pollen during the months of August and September, although these began at earlier dates. The fact that these groups were shedding pollen during a period before symptoms began does not exclude them as contributory causes, for the latter days of September, yet in the latter period they have severe symptoms. It appears that once the rhinitis is established it takes less pollen to keep it active than it did to incite it, and likewise that a specific pollen not sufficient in itself to incite the symptoms may be a very important contributory cause. Failure to discover and to treat for these contributory causes we believe accounts for the failure to secure complete relief in many of the cases. In order that the diagnosis be complete it is necessary that the patient be tested for all pollens present in the atmosphere coincident with the symptoms.

Test Materials

Dried pollen has much to recommend it as the most satisfactory material for testing. Not only is it the least expensive, but also the most stable. The potency of all extracts diminishes with age.

while dried pollen, if kept dry, may for all practical purposes be considered as completely stable. We have pollens several years old that elicit as strong reactions as pollens collected the past season.

Because of the immunologic overlapping between closely related species constituting a group, we believe that group tests are justifiable, for they reduce the amount of testing to a minimum and furnish information equal in practical value with that obtained with tests done with individual species. If, for example, the patient reacts to a test with a mixture of the ragweed and its relatives little practical value is learned by the application of the component species separately, since reaction will almost without exception be obtained in some measure to all. Even if one wishes to investigate the question of specificity the group testing is a valuable and time-saving preliminary step.

With the majority of the groups the situation is comparable to that of the ragweeds. Exceptions must be made for groups two, four, and five. Group two and five each contain species of two separate and not very closely related families. When these groups are involved in the causation of symptoms in a given patient individual tests with the more important species are necessary as a guide to proper treatment.

The method of testing with dried pollen is simple. A scratch about one-eighth of an inch in length is made in the skin. The flexor surface of the forearm is usually used because of convenience. Upon the scratch is placed a drop of tenth normal sodium hydroxide and a small quantity of dried pollen is then added. The amount of pollen which can be picked up on the small end of a toothpick is an adequate quantity. Reactions appear within a few minutes (15 to 30). A control test should be made simultaneously with the specific tests for comparison. This consists merely of a scratch upon which is placed a drop of the n/10 NaOH Solution.

Reading the Tests

A positive reaction usually manifests itself in wheal formation and erythema and frequently is accompanied by itching. However, an amount of wheal formation or erythema exceeding that manifested by the control may usually be considered as a positive reaction. When in doubt concerning a questionable reaction it is wise to repeat the test along with another control.

The all-important fact to be determined from the scratch test is whether it be *positive* or *negative*. The measuring of reactions obtained by this method in terms of centimeters gives no useful information. One frequently sees marked positive reactions upon a patient who gives a history of only a slight hay fever and conversely obtains slight reactions upon other patients who have severe symptoms.

Completing the Diagnosis

With the results of the tests for sensitivity in our hands we are in a position to complete the diagnosis. This is extremely important, for without it the correct specific treatment is impossible. In making the diagnosis we must use the history given by the patient as to the *period during which hay fever symptoms occur,* the results of the skin tests, and the knowledge of the flowering periods of the plants to which positive skin tests were obtained. The procedure can best be illustrated by actual case records.

Case 1.—S. K., male, aged twenty-one years, has had hay fever for the past four years. Symptoms begin about the middle of August and continue until frost. Tested routinely with the 16 groups, he reacted to groups 6 and 16. Consulting Chart 1 we note that group 6 has completed pollination by May 15 and can be dismissed at once as a factor in producing the hay fever symptoms complained of by this patient. The chart shows that group 16 begins to shed pollen about August 1 and continues to do so until the middle of October, that is to say, until the average date of frost. The pollens responsible for his symptoms are in the air approximately two weeks before the symptoms occur, but the quantity is insufficient to produce symptoms. Although we must admit that the evidence is circumstantial, it is a justifiable conclusion that the ragweeds and their close relatives (group 16) are responsible for the symptoms of this patient. Although it seems to be generally believed that this is the usual type of sensitivity found in cases of fall hay fever, it is in our experience the exception rather than the rule. Among 100 cases of hay fever with symptoms during August and September we found that only 5.5 per cent were sensitive to the ragweed group exclusively.

Case 2.—M. B., male, aged twenty-one years, has had hay fever the past two seasons. Symptoms have begun about August 20 and continued until October. Tested routinely with the 16 groups, a single positive reaction was obtained to group 15, the sage wormwood (artemisia) group. Reference to Chart 1 reveals that the pollinating period of the group is from the end of the first week in July to October 1. If the reader will refer to the publication of Ellis and Rosendahl[3] he will find that this group comprises nine species of Artemisia, only one of which produces pollen before August 1. We have learned by studies of the atmospheric content of pollen that the height of pollination of Artemisia is

reached after the middle of August. Although some Artemisia pollen was in the air before this date the quantity was not sufficient to produce symptoms in this patient.

By the same procedure that attributed the hay fever condition of Case 1 to ragweed we must conclude that the causes of hay fever in Case 2 belong to group 15, the sage-wormwood (Artemisia) group. Ellis and Rosendahl have called attention to the apparent neglect of the pollens of this group as causes of hay fever in the upper Mississippi valley.

Case 3.—H. C., male, aged nineteen years, has had hay fever during the past three years. The hay fever symptoms begin in the very last part of July and continue until frost, but the severity is much less after the middle of September. Routine skin testing resulted in positive reactions to groups 6, 13, 14, 15, and 16. Group 6 is immediately eliminated because no pollen is shed later than the middle of May. Although the period of symptoms coincides with those of Cases 1 and 2, one cannot, as in those cases, attribute the condition to a single cause. We must conclude that pollens separately responsible for the hay fever of Cases 1 and 2 are both involved in Case 3. Furthermore, we cannot dismiss groups 13 and 14, since these are both shedding pollen during the period of symptoms in this patient. The fact that these groups (pigweed and Russian thistle) were shedding some pollen as early as the latter part of June does not eliminate them from consideration as important contributory causes during the fall period, for as shown by studies on air pollen content these groups produce pollen abundantly during August and September. We must conclude that this patient has hay fever caused by no less than four separate and distinct groups of plants each antigenically different from the others. This patient received treatment with ragweed extract at a Minneapolis clinic in 1932 with very slight benefit. In 1933 he received treatment with extracts of the four groups mentioned above with 100 per cent relief.

Case 4.—B. F., female, aged forty-five years, has had hay fever for twenty-five years. The symptoms begin in May each year and continue until frost. The most severe period is during August and September. She has had previous treatment with ragweed pollen extract with only partial relief. Skin tests were made with the 16 groups. Positive reactions were obtained with groups 8, 13, 14, 15, and 16. Comparing these numbers with Case 3 it will be observed that these have four groups in common while this case has group 8 additionally. We have in this case causes of hay fever derived from five antigenically separate groups as follows: Grasses, pigweed, Russian thistle, wormwood and ragweed groups. Consulting Chart 1 we find that the grasses begin pollinating in May and therefore coincide with the beginning of symptoms. As the season progresses, not only are more causes added, but the total amount of pollen increases from month to month. The early symptoms here are no doubt due to grasses alone. Toward the latter part of June the pigweed and Russian thistle groups begin to flower. The Artemisia and ragweed groups are added during the latter days of July. All of these groups continue to pollinate until frost, a point which is sometimes overlooked. This patient received specific treatment in 1933 with 100 per cent relief.

Case 5.—F. R. W., female, aged twenty-three years, has had hay fever for the past ten years. She had been previously treated with pollen extract with no appreciable relief. Her symptoms begin the last of May and continue until about September 1. Tests with subgroups (tribes) of the grass family were all positive. A strong positive reaction was also obtained with the pigweed-tumbleweed pollens. The tests were not positive to the Russian thistle or other groups at this time. She received treatment with a mixed grass pollen extract and an extract of pigweed group pollen in 1932 with complete relief. The same treatment was begun in the spring of 1933 and no symptoms occurred until about the middle of July, this in spite of what had been adequate treatment for the specific causes previously determined. It was therefore suspected that a new sensitivity had been developed. Considering the period at which symptoms occurred, it is obvious (Chart 1) that Russian thistle would be most likely involved. Skin tests were made with the discovery of sensitivity to this group, which was not the case a year previously. Extracts of the Russian thistle were therefore added and complete relief was again obtained.

Our purpose in reciting these cases is threefold:

1. To demonstrate the methods of making diagnosis.
2. To emphasize the importance of discovering multiple sensitivity.
3. To bring out the importance of re-testing the cases which fail to respond to a treatment which has previously been successful (Case 5.)

The Choice of Materials for Treatment

Once the diagnosis of the causes has been made the next step is the selection of the treatment extracts. As we have already pointed out, multiple sensitization is the rule rather than the exception, even when the term multiple sensitivity is restricted to unrelated groups.

Within the groups the species are so closely related that reactions as a rule occur to all. The pollens of these closely related species must contain an exciting agent which is common to all. Whether a species may contain a specific excitant in addition to the excitant common to all members of the group, cannot at present be positively stated. Differences of opinion exist and information gained by methods of investigation now extant is inconclusive. Certain general principles should, however, be observed in selecting the materials for the treatment of a particular case.

1. Choose treatment pollen extracts only from those groups which produce positive reactions and *to which the patient is known to be clinically sensitive.* The latter requirement is fulfilled by occurrence of symptoms during period of pollination.

2. If there are several pollens within a group that occur in the patient's environment, it is advisable in view of the present state of our knowledge to use a mixture of those pollens, the proportions of each to be determined by the relative amounts in the patient's environment.

3. If extracts of single pollen are used (warranted only if extracts fulfilling No. 2 are not obtainable) choose the most important species of the group.

In a previous publication (MINNESOTA MEDICINE, June, 1933) we have given a complete list of the hay-fever-causing plants of Minnesota, and have designated by an asterisk those most important from the standpoint of general occurrence and abundance of distribution. In general, we believe that selecting for treatment the pollens of plants so designated is rational and will give satisfactory results. However, the number of species which may cause hay fever is so large and the distribution so far from uniform that for more exact purposes we recommend the application of principle two, as stated above. To make individualization of the treatment possible the clinician must have available particular information in regard to distribution of the various species. In this connection we are presenting in map form (Plates I, II, III) the distribution of the more important species occurring within the State. In the following pages we present a brief discussion of each of the groups, together with the pollen combinations which in our experience have proven most satisfactory.

I. *The Maple Group—Aceraceæ.*—The maple group has the distinction of opening the hay fever season in Minnesota. The two species chiefly concerned in producing a concentration of about 75 pollen grains per cubic yard of April air are the soft maple and the box elder. Of the two the box elder is by far the most important, partly because of the much heavier pollen production, and partly because it is one of the most commonly planted trees in cities, villages, and farms. It is also a common native tree in the stream and river valleys of the southern half of the state. In treating for this group a pollen mixture of the following composition should be used:

Soft Maple—Acer saccharinum	25 per cent
Box Elder—Acer Negundo	75 per cent

II. *Birch Group—Betulaceæ.*—This group consists of a fairly large number of native shrubs and trees which contribute considerably to the pollen content of the air from early April until about the middle of May. The main period for the Twin City area occurs towards the end of April, when a concentration as high as 125 pollen grains per cubic yard is attained. Several species of the group have a wide distribution and in many places they occur abundantly, yet in our experience the group as a whole is responsible for relatively few hay fever cases.

Pollen combinations recommended for treatment:

Common Hazel—Corylus americana	25 per cent
Ironwood—Ostrya virginiana	25 per cent
Canoe Birch—Betula papyrifera	50 per cent

III. *Poplar—Willow Group—Salicaceæ.*—The Poplars and Cottonwoods are strictly wind pollinated and two or three species constitute the chief pollen producers of the group. The amount of Cottonwood pollen alone reaches the very high concentration of 650 grains per cubic yard of air towards the end of April. The flowers of the Willows, on the other hand, contain nectar glands, and it has been assumed that their pollen is transported by insects and not by wind. In our pollen survey willow pollen has frequently been found on the slides and this fact indicates that these very abundant shrubs and trees cannot be wholly ignored as a possible factor in hay fever causation during the spring season.

Pollen combinations recommended for treatment:

Aspen—Populus tremuloides	25 per cent
Cottonwood—Populus deltoides	50 per cent
Crack Willow—Salix fragilis	25 per cent

IV. *The Elm-Nettle Group—Urticaceæ.*—This is a somewhat diverse group comprising trees and herbs. Our studies thus far strongly suggest an antigenic relationship between the members of the group as at present constituted. Because of diverse constitution the group covers a wide seasonal range extending from early April until the middle of August. The greatest pollen concentration, 450 pollen grains per cubic yard of air, comes about the middle of April and is due to the preponderance of elms as park and boulevard trees in cities and villages of the State and to their very general occurrence as native forest trees. The elm season is comparatively short, but continued presence of the pollens of this group is maintained by a succession of other members. The hackberry and mulberry follow the Elm and these are succeeded by the nettle and hemp.

For the patients sensitive to this group, if the symptoms are confined to April and May, the following combination of pollens are recommended for treatment:

Elm—Ulmus americana	60 per cent
Mulberry—Morus alba	20 per cent
Hackberry—Celtis occidentalis	20 per cent

For the Group 4 sensitive patient who begins with symptoms early in the spring and continues throughout the summer the extracts of the early and late pollinators

SOFT MAPLE
Acer saccharinum

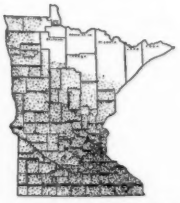
BOX ELDER
Acer Negundo

COMMON HAZEL
Corylus americana

PAPER BIRCH
Betula papyrifera

COTTONWOOD
Populus deltoides

AMERICAN ELM
Ulmus americana



STINGING NETTLE
Urtica gracilis

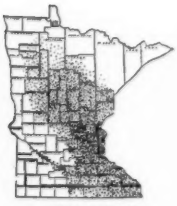
HEMP
Cannabis sativa

LONG-BEAKED SEDGE
Carex longirostris

GREAT BULRUSH
Scirpus validus

BLACK ASH
Fraxinus nigra

BUR OAK
Quercus macrocarpa



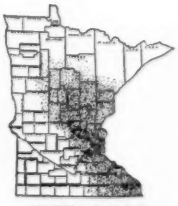
HILLS OAK
Quercus ellipsoidalis

RED OAK
Quercus borealis

BUTTERNUT
Juglans cinerea

RIB GRASS
Plantago lanceolata

COMMON PLANTAIN
Plantago major



SHEEP SORREL
Rumex acetosella

CURLED DOCK
Rumex crispus

PALE DOCK
Rumex mexicanus

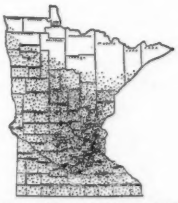
PLATE I

REED CANARY GRASS
Phalaris arundinacea

TIMOTHY
Phleum pratense

RED TOP
Agrostis alba

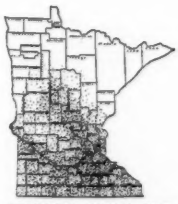
JUNE GRASS
Poa pratensis


HUNGARIAN BROME GRASS
Bromus inermis

ORCHARD GRASS
Dactylis glomerata

RYE
Secale cereale

QUACK GRASS
Agropyron repens


NODDING WILD RYE
Elymus canadensis

PIGEON GRASS
Setaria glauca

CRAB GRASS
Digitaria sanguinalis

BARNYARD GRASS
Echinochloa Crus-galli

OATS
Avena sativa

HAIRY MESQUITE GRASS
Bouteloua hirsuta

BECKMANNIA
Beckmannia erucaeformis

TALL MARSH GRASS
Spartina Michauxiana

WILD RICE
Zizania aquatica

BLUE STEM
Andropogon furcatus

INDIAN GRASS
Sorghastrum nutans

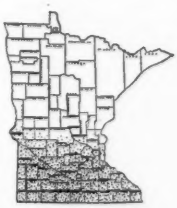

SUDAN GRASS
Andropogon Sorghum var. sudanensis

PLATE II

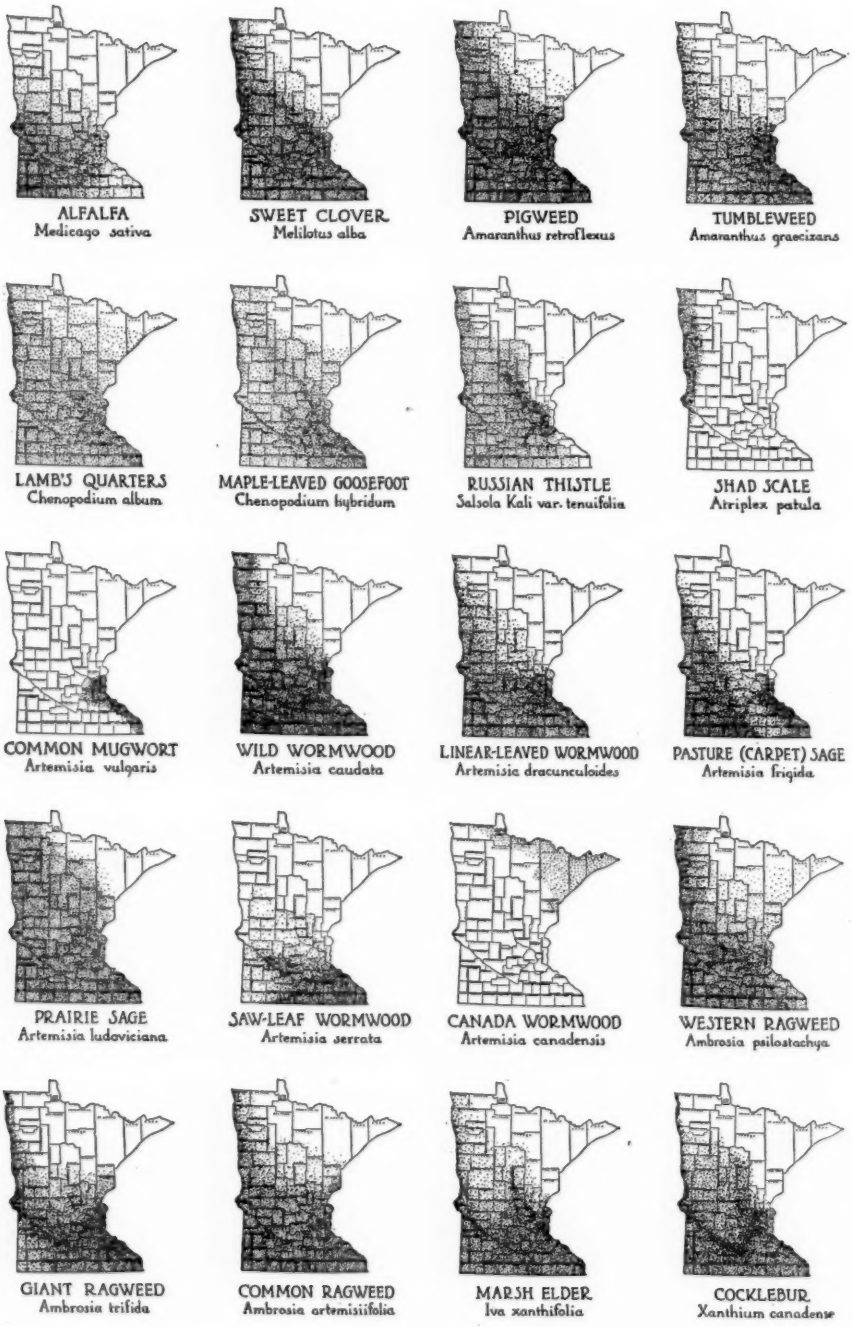

ALFALFA
Medicago sativa
SWEET CLOVER
Melilotus alba
PIGWEED
Amaranthus retroflexus
TUMBLEWEED
Amaranthus graecizans
LAMB'S QUARTERS
Chenopodium album
MAPLE-LEAVED GOOSEFOOT
Chenopodium hybridum
RUSSIAN THISTLE
Salsola Kali var. tenuifolia
SHAD SCALE
Atriplex patula
COMMON MUGWORT
Artemisia vulgaris
WILD WORMWOOD
Artemisia caudata
LINEAR-LEAVED WORMWOOD
Artemisia dracunculoides
PASTURE (CARPET) SAGE
Artemisia frigida
PRAIRIE SAGE
Artemisia ludoviciana
SAW-LEAF WORMWOOD
Artemisia serrata
CANADA WORMWOOD
Artemisia canadensis
WESTERN RAGWEED
Ambrosia psilostachya
GIANT RAGWEED
Ambrosia trifida
COMMON RAGWEED
Ambrosia artemisiifolia
MARSH ELDER
Iva xanthifolia
COCKLEBUR
Xanthium canadense

PLATE III

may be combined with advantage. The following combination is recommended:

Elm—Ulmus americana .....30 per cent
Mulberry—Morus alba.....20 per cent
Nettle—Urtica gracilis.....20 per cent
Hemp—Cannabis sativa.....30 per cent

V. *Sedge-Bulrush Group—Cyperaceæ.*—The group has not hitherto been considered a significant factor in the incidence of hay fever, but in our work sensitivity has been established in a few cases, 19.6 per cent of 300 cases. This fact, considered in connection with the abundant occurrence of the *Cyperaceæ* in many localities of the State and the relatively heavy pollen production of many of the species, indicates that the group should not be ignored in diagnostic tests and treatment. Pollen concentration is certain to be high in the vicinity of lakes, marshes, and moist meadows.

Pollen combination recommended for treatment:

Tussock Sedge—Carex stricta.....30 per cent
Long-beaked Sedge—Carex longirostris.....30 per cent
Great Bulrush—Scirpus validus.....40 per cent

VI. *Ash Group—Oleaceæ.*—Only two species of ash, the green and the black, occur in sufficient abundance in Minnesota to be considered a factor in hay fever causation. Both are common in the hardwood areas of the southeastern and middle parts of the State, while the black ash is also abundant in many places nearly throughout the evergreen forest of the north and northeast. Pollen production is heavy (about 100 grains per cubic yard), but the pollinating period is short, lasting only two to three days in any given locality.

Pollen combination recommended for treatment:

Green Ash—Fraxinus pennsylvanica.....50 per cent
Black Ash—Fraxinus nigra.....50 per cent

VII. *The Oak Group—Fagaceæ.*—The oaks are represented in the State by eight species, five of which are widely distributed and three of these form in many places almost pure oak thickets and forests. The pollen production is very heavy and about mid-May reaches a concentration of 600 grains per cubic yard.

Pollen combination recommended for treatment:

Bur Oak—Quercus macrocarpa.....30 per cent
Hill's Oak—Quercus ellipsoidalis.....30 per cent
Red Oak—Quercus borealis.....20 per cent
White Oak—Quercus alba.....20 per cent

VIII. *Grass Groups.*—Patients sensitive to grasses react to a number of different species, but the results of testing are by no means uniform. Grass hay fever is caused by a combination of grasses, the pollination periods of which overlap. The number of species is so great that it would be a well-nigh hopeless problem to treat for all. In our former paper (1) accordingly the grass family was divided into a number of groups based on natural affinity, and it was assumed that some at least of these natural units possessed a definite specificity. In marked contrast to this is the view of Thommen[8] that satisfactory therapeutic results may be obtained with a single grass pollen extract, namely timothy, and with this opinion Cooke,[9] Vander Veer[9] and others agree. On the other hand, the opinions of Rackemann,[7] Watson and Kibler,[10] and Piness[6] are at variance and until there is more universal agreement upon the therapeutic sufficiency of timothy pollen extract as a protection against all other grass pollens, we feel that a much better course to follow is that of the group principle stated above. Theoretical considerations support the use of mixed extracts, and since such an extract is as easily prepared as a single extract there certainly can be no argument against it. We have selected several species of grasses as most important for this region, the basis for selection being, as in the case for the other groups, as follows: (1) These species are widely distributed; (2) they produce pollen abundantly; (3) they overlap in the time of pollination; (4) skin tests to these tend uniformly to excite positive reactions.

This mixture has given excellent results. The species represented and the proportions of pollens are:

1. June Grass—Poa pratensis.....60 per cent
2. Timothy—Phleum pratense.....10 per cent
3. Brome Grass—Bromus inermis.....10 per cent
4. Quack Grass—Agropyron repens.....10 per cent
5. Sorghum—Andropogon sorghum..... 5 per cent
6. Goose Grass—Eleusine indica..... 2 per cent
7. Corn—Zea Mays..... 1 per cent
8. Barnyard Grass—Echinochloa crus-galli 1 per cent
9. Sweet Vernal—Anthoxanthum odoratum 1 per cent

This is not offered as the last word in the treatment of hay fever due to grass pollen. Should methods be developed that will clearly demonstrate specificities among the grasses, these must then receive proper attention. Until then the mixture which we propose is more rational than the use of a single extract such as timothy or of mixtures not based upon the local flora.

IX. *Walnut Group—Juglandaceæ.*—The group is composed of four native species of trees which are limited in their occurrence mainly to the southeastern and eastern parts of the State. Only one of these—the butternut—is moderately abundant along the eastern border northward to Pine County and the pollen concentration so far has been found to be light, only about 10 grains per cubic yard. The group may become more significant because the black walnut is being planted considerably along our new highways.

Pollen combination:

Black Walnut—Juglans nigra.....25 per cent
Butternut—Juglans cinerea.....60 per cent
Bitternut Hickory—Carya cordiformis.....15 per cent

X. *The Plantain Group—Plantaginaceæ.*—In some parts of the country the Plantaginaceæ constitute a group of troublesome hay fever plants, but in our work they have proven only of minor importance. Locally the pollen concentration is low, but in some places two members of the group, viz., rib grass and dooryard plantain, are very common weeds of neglected gardens and farm yards and in such situations concentrations sufficiently high to cause serious disturbance are to be expected.

Pollen combinations recommended for treatment:

Rib Grass—Plantago lanceolata.....40 per cent
Common Plantain—Plantago major.....60 per cent

XI. *The Dock Group—Polygonaceæ.*—This group is made up of a number of species that occur as abundant weeds in the older farming communities of the State. On sandy and acid soils the common sheep sorrel grows in profusion and moreover produces pollen in abundance. The pollens of this group make their appearance in the latter part of May and attain their peak during the first half of June. The importance of these weeds as causes of hay fever is probably greater than has been generally recognized. Approximately 20 per cent of the cases (300) that we have studied are sensitive to this group.

Pollen combination recommended for treatment:

Sheep Sorrel—Rumex acetosella.....40 per cent
Curled Dock—Rumex crispus.....30 per cent
Pale Dock—Rumex mexicanus.....30 per cent

XII. *Alfalfa Group—Leguminosæ.*—Members of the pea family are insect pollinated, but the flowers of certain species are so constructed that pollen is ejected explosively when the nectar-collecting insects touch off a trigger-like mechanism that holds the stamens under tension. The pollen is thrown to a distance of several centimeters and is caught up by passing air currents. Both alfalfa and sweet clover have this explosive pollinating method and both species are extensively cultivated throughout the southern and western parts of the State. Pollen concentration has not been found heavy in the cities, but in the rural districts it is certain to reach significant proportions.

Pollen combination recommended for treatment:

Alfalfa—Medicago sativa.....50 per cent
Sweet Clover—Melilotus alba.....50 per cent

XIII. *Pigweed Group—Amaranthaceæ.*—This group includes a number of very common weeds of fields, gardens, and vacant lots, and it is involved in approximately 30 per cent of hay fever cases seen at the University of Minnesota Students' Health Service. Of these the common pigweed or redroot *(Amaranthus retroflexus)* is the most important, producing about 50 per cent of the air-borne pollen of the group for the Twin City area. For the same region the tumbleweed *(Amaranthus græcizans)* and the green amaranth *(Amaranthus hybridus)* rank about equal in importance, but considerably behind the Redroot. In the southern part of the State, however, and from thence southwestward to Oklahoma another member of the group, namely the water hemp *(Acnida tuberculata)* becomes increasingly troublesome.

In treating for this group we have obtained excellent results with a mixture of the following composition:

Redroot—Amaranthus retroflexus.....50 per cent
Tumbleweed—Amaranthus græcizans.....25 per cent
Green Amaranth—Amaranthus hybridus.....25 per cent

XIV. *Russian Thistle Group—Chenopodiaceæ.*—Several species of this group occur widely throughout the State, while others are somewhat localized yet they are generally abundant in their respective areas. As in the preceding group several members of it are especially obnoxious because of their preference for rich garden soils and saline spots of barnyards. Some, like the Russian Thistle, are very aggressive and quickly take complete possession of such newly bared areas as roadcuts and fills, sand dunes and fallow fields. The burning bush or kochia is rapidly becoming a favorite ornamental plant of the ubiquitous filling station.

Pollen combination:

Lambs Quarter—Chenopodium album.....30 per cent
Maple-leaved Goosefoot—Chenopodium hybridum 20 per cent
Russian Thistle—Salsola Kali var. tenuifolia 30 per cent
Burning Bush—Kochia scoparia.....20 per cent

XV. *Sage-Wormwood Group—Compositæ.*—The importance of the recognition of this group as one of the primary factors in the causation of autumn hay fever in the upper Mississippi valley has been dealt with in two of our previous papers.[3, 4] Subsequent clinical experience has further emphasized the need of diagnosis and treatment for members of the group independently of the ragweeds.

Pollen combination recommended:

Dragon Sage—Artemisia dracunculoides.....40 per cent
Prairie Sage—Artemisia ludoviciana.....20 per cent
Mugwort—Artemisia vulgaris.....20 per cent
Pasture (carpet) Sage—Artemisia frigida.....20 per cent

XVI. *Ragweed Group—Ambrosiaceæ.*—The group continues to hold its unenviable front rank position in the causation of hay fever in the State and it is disconcerting to find that all members of the group are becoming more abundant in most places, and that several species are extending their range and are becoming established in localities where they were formerly unknown. The northward migration of the ragweeds is due to a combination of factors, chief of which are the extension and multiplication of highways, greatly increased traffic and a succession of dry, warm summers. The latter would permit the growth and maturation of these weeds where formerly the temperature was too low or the season too short for seed development.

Pollen combination recommended for treatment:

Common Ragweed—Ambrosia artemisiifolia..50 per cent
Giant Ragweed—Ambrosia trifida.....25 per cent
Western Ragweed—Ambrosia psilostachya....10 per cent
Marsh Elder—Iva xanthifolia.....10 per cent
Cocklebur—Xanthium canadense..... 5 per cent

Treatment

Prophylactic.—As we have previously pointed out, adequate treatment necessitates the use of extracts from all pollen groups which are responsible for the hay fever of the individual patient. If some are left out the treatment is only partial and partial relief only can be expected. Having decided which pollen extracts are to be used in treatment there is left for consideration

TABLE I. CLASSIFICATION OF SENSITIVITY

Solution No.	1	2	3	4
Concentration c.c.				
Pollen Unit	10.	100.	1000.	10000.
(Pollen Dilution)	(1-100,000)	(1-10,000)	(1-1000)	(1-100)
(Mg. Pollen)	(.01)	(.1)	(1.)	(10.)
Mg. Protein	.001	.01	.1	1.
Mg. Nitrogen	.0001	.001	.01	.1
Class	Reaction	Reaction	Reaction	Reaction
A	Marked	Marked +		
B	Moderate	Marked	Marked +	
C		Moderate	Marked	
D			Moderate	Marked or Moderate

only the question of dosage. This must also be adequate. Unfortunately no dosage schedules can be set up which will meet the requirements of all individuals as is possible, for example, with the toxoid for immunizing against diphtheria. Not only do individuals vary to an extreme degree as to the amounts necessary to bring relief, but also in the amounts which they can tolerate. The maximum dose which may be given safely to one individual may be a very hazardous one, even fatal, to another. In endeavoring to give adequate treatment it is proper to aim at as high a dosage as can be given without untoward effects.

In any case the treatment must be begun with a relatively small dose and increased at each succeeding injection until a maximum is reached. Obviously in order that such procedure may be carried out, some sort of standardization of the extract used is required. It is unfortunate that manufacturers of pollen extracts use different methods of standardization. Whether one of these methods is superior to others is still disputed. Some are standardized in terms of pollen units, others in terms of total nitrogen content, and still others in terms of protein nitrogen. Satisfactory results can be obtained with extracts standardized by various methods. It is advisable, however, to adopt one and adhere to it to avoid the confusion in dosage schedules consequent upon the use of extracts standardized by different methods. In selecting a brand of extracts avoid those which are marketed only in fixed doses (packages of individual doses), since these require that all patients shall receive an identical amount of treatment. Select a product which permits a determination of the degree of sensitivity of the patient and of a corresponding variation in the size of the successive doses. By whatever method the extract be standardized one can not intelligently start the treatment until by quantitative tests the degree of sensitivity of the patient to the extract to be used has been ascertained. This is determined by intracutaneous injections of appropriate dilutions. A generally accepted rule for a safe initial dose is 0.1 c.c. of the strongest dilution giving a moderate (not marked) positive reaction. Cooke has prepared a convenient classification of patients into four groups, Class A being the most sensitive and Class D the least. The solutions used by him were standardized in terms of nitrogen content, the test extracts containing .0001, .001, .01, and .1 mg. respectively of nitrogen per c.c. The last three dilutions make ideal treatment dilutions and can therefore be used for both purposes. For practical purposes comparable dilutions of extracts based on pollen units would contain 10 units, 100 units, 1,000 units, and 10,000 respectively.

Comparable dilutions based on pollen protein would contain .0005, .005, .05, and .5 mg. of pollen protein per c.c.

The quantitative test is made by injecting into the skin preferably on the flexor surface of the forearm .02 c.c. of the test solutions. In actual practice it is best to test first with the two weakest dilutions. After five to ten minutes, readings are taken and it can then be determined whether it is necessary to make further tests. Adherence to this practice will avoid many unpleasant reactions.

In Table I appears a convenient scheme for classification of the patient according to sensitivity. A reaction is considered *moderate* when

TABLE II

CLASS		A					B				C				D			
Dose No.	Multiple of 1st Dose	Solution No.	Dose in c.c.	Pollen Unit	Mg. Pollen	Mg. Pollen Protein	Mg. Nitrogen	Solution No.	Dose in c.c.	Pollen Units	Mg. Pollen	Mg. Pollen Protein	Mg. Nitrogen	Solution No.	Dose in c.c.	Pollen Units	Mg. Pollen	Mg. Protein	Mg. Nitrogen
1	1	2	.05	5	.005	.0005	.00005	2	.1	10	.01	.001	.0001	2	.2	20	.02	.002	.0002	3	.05	50	.05	.005	.0005
2	2	2	.1	10	.01	.001	.0001	2	.2	20	.02	.002	.0002	2	.4	40	.04	.004	.0004	3	.1	100	.1	.01	.001
3	4	2	.2	20	.02	.002	.0002	2	.4	40	.05	.004	.0004	2	.8	80	.08	.008	.0008	3	.2	200	.2	.02	.002
4	7	2	.35	35	.035	.0035	.00035	2	.7	70	.07	.007	.0007	3	.14	140	.14	.014	.0014	3	.35	350	.35	.035	.0035
5	10	2	.5	50	.05	.005	.0005	3	.1	100	.1	.01	.001	3	.2	200	.2	.02	.002	3	.5	500	.5	.05	.005
6	15	2	.75	75	.075	.0075	.00075	3	.15	150	.15	.015	.0015	3	.3	300	.3	.03	.003	3	.75	750	.75	.075	.0075
7	20	3	.1	100	.1	.01	.001	3	.2	200	.2	.02	.002	3	.4	400	.4	.04	.004	4	.1	1000	1.	.1	.01
8	30	3	.15	150	.15	.015	.0015	3	.3	300	.3	.03	.003	3	.6	600	.6	.06	.006	4	.15	1500	1.5	.15	.015
9	40	3	.2	200	.2	.02	.002	3	.4	400	.4	.04	.004	3	.8	800	.8	.08	.008	4	.2	2000	2.	.2	.02
10	60	3	.3	300	.3	.03	.003	3	.6	600	.6	.06	.006	4	.12	1200	1.2	.12	.012	4	.3	3000	3.	.3	.03
11	80	3	.4	400	.4	.04	.004	3	.8	800	.8	.08	.008	4	.16	1600	1.6	.16	.016	4	.4	4000	4.	.4	.04
12	100	3	.5	500	.5	.05	.005	4	.1	1000	1.	.1	.01	4	.2	2000	2.0	.2	.02	4	.5	5000	5.	.5	.05
13	120	3	.6	600	.6	.06	.006	4	.12	1200	1.2	.12	.012	4	.24	2400	2.4	.24	.024	4	.6	6000	6.	.6	.06
14	150	3	.75	750	.75	.075	.0075	4	.15	1500	1.5	.15	.015	4	.38	3000	3.	.3	.03	4	.75	7500	7.5	.75	.075
15	180	3	.9	900	.9	.09	.009	4	.18	1800	1.8	.18	.018	4	.36	3600	3.6	.36	.036	4	.9	9000	9.	.9	.09
16	200	4	.1	1000	1.	.1	.01	4	.2	2000	2.	.2	.02	4	.4	4000	4.	.4	.04	4	1.	10000	10.	1.	.1
17	240	4	.12	1200	1.2	.12	.012	4	.24	2400	2.4	.24	.024	4	.44	4800	4.8	.48	.048	5*	.6	12000	12.	1.2	.12
18	280	4	.14	1400	1.4	.14	.014	4	.28	2800	2.8	.28	.028	4	.56	5600	5.6	.56	.056	5	.7	14000	14.	1.4	.14
19	320	4	.16	1600	1.6	.16	.016	4	.32	3200	3.2	.32	.032	4	.64	6400	6.4	.64	.064	5	.8	16000	16.	1.6	.16
20	360	4	.18	1800	1.8	.18	.018	4	.36	3600	3.6	.36	.036	4	.72	7200	7.2	.72	.072	5	.9	18000	18.	1.8	.18
21	400	4	.2	2000	2.	.2	.02	4	.4	4000	4.	.4	.04	4	.8	8000	8.	.80	.08	5	1.	20000	20.	2.	.2

5* = Twice strength of No. 4.

there is definite increase in the size of the wheal produced by the intradermal injection, the outline remaining smooth and surrounded by an area of erythema. A *marked* reaction is characterized by distinct pseudopod formation rendering the outline of the wheal irregular. A *marked plus* reaction differs from a marked reaction only in size, spreading over a large area.

Dosage.—In the prophylactic treatment the aim should be to attain as large a dose as the patient can tolerate without untoward effects. Having classified the patient as to sensitivity it is necessary to have a tentative dosage schedule. The dose must, of course, be increased gradually. As a rule the tolerance dose may be reached in fifteen to twenty doses. The first five or six doses are quite small, and if desired may be given at two or three day intervals. As the size of the dose increases, a longer interval, five to seven days, is desirable to avoid cumulative effects. In Table II appears a suggested dose schedule for the various classes of sensitivity. Dosage is shown for extracts standardized by four methods commonly in use. We do not mean to imply that the dose of an extract standardized by one is identical with another. However, the dose of one is roughly comparable to the other. The scheduled rate of increase is tentative only, having been found by experience to be justified in the majority of cases. If unpleasant reactions occur the physician must exercise judgment and individualize his dosage. If one uses dilutions of the strength suggested in Table I designated by numbers 2, 3, and 4 flexibility is provided.

When the patient is sensitive to more than one group of unrelated pollens success can be attained only if an *adequate* dose is reached in the case of *each* extract. This obviously calls for considerable caution and exercise of judgment. When two or three different extracts are to be given simultaneously it will usually be advisable to reduce the dose of each somewhat below that which would be used if each extract were to be given singly. In this case a greater number of doses will be required to reach an adequate dosage of each.

Reactions.—If proper attention is given the matter of dosage based upon a classification of the sensitivity of the patient, alarming constitutional reactions will be infrequent. Even with the utmost care in dosage the amount of extract injected may occasionally exceed the tolerance of the shock organ if this is rapidly absorbed and an constitutional reaction may result immediately. It is conceivable that in giving a subdermal injection one might occasionally puncture a small vein and thus deliver the entire content of the syringe directly into the blood stream. To guard against this possibility Duke advises placing a tourniquet above the injection site. To further insure a not too rapid absorption it is advisable to mix with each dose of extract about 0.1 c.c. of epinephrin (1-1,000). When blanching of the tissues occurs at the injected area the tourniquet is removed.

Symptoms such as sneezing, coughing, itching of the skin, lachrymation, or asthma following an injection deserve serious consideration and measures should be immediately instituted to check the reaction. It is advisable to apply a tourniquet proximal to the injection site. For the control of the symptoms epinephrin is easily

TABLE III. DOSAGE SCHEDULE FOR PHYLACTIC TREATMENT OF A "C" CLASS PATIENT

Day	Dose Number	Solution Number	Dose c.c.	Pollen Units	Mg. Nitrogen
1	1	2	.1	10	.0001
2	2	2	.12	12	.00012
3	3	2	.144	14.4	.000144
4	4	2	.17	17	.00017
5	5	2	.2	20	.0002
6	None				
7	6	2	.24	24	.00024
8	None				
9	7	2	.3	30	.0003
10	None				
11	8	2	.36	36	.00036
12	None				
13	9	2	.43	43	.00043
14	None				
15	10	2	.5	50	.0005
16	None				
17	None				
18	11	2	.6	60	.0006
19	None				
20	None				
21	12	2	.72	72	.00072
22	None				
23	None				
24	15	2	.86	86	.00086
25	None				
26	None				
27	16	2	.93	93	.00093
28	None				
29 & 30	17	2	1.11	111	.0011

the most valuable agent. One-fourth to one-half c.c. if given promptly will usually be sufficient. Part of the dose should be injected into the site of the pollen injection. When the symptoms have subsided the tourniquet may be removed, but should be replaced immediately if symptoms recur. *Under no circumstances should an injection of pollen extract be made unless adrenalin is at hand.* After adrenalin has checked the advance of the attack morphin sulphate in proper amount, depending upon age or weight of the patient, is a valuable adjuvant and calms the mental and physical distress attending the reaction and the often unpleasant effects of the adrenalin as well.

Phylactic.—Many patients do not seek treatment until the pollen season and its consequent symptoms have already begun. Although the preseasonal treatment is the method of choice, excellent results are frequently obtained with co-seasonal administration of pollen extracts. While the mechanism of relief is no doubt the same in the two methods the application of the co-seasonal treatment differs because of certain important considerations from that outlined for the pre-seasonal cases. First, because the symptoms have already appeared, one desires to attain the dosage necessary for protection as quickly as possible *with safety*. Because of the time element the usual interval between doses as in the preseasonal method is shortened and the danger of cumulative effects arises. Second, in the preseasonal treatment the occurrence of symptoms such as sneezing, lachrymation, etc., indicate an overdose and, therefore, serve as an important guide to subsequent dosage. In co-seasonal treatment this important guide is not available, since the constitutional symptoms when they occur cannot be distinguished from the symptoms due to exposure to pollen in the air. Third, because a certain variable but by no means insignificant amount of pollen excitant is being absorbed from air-borne pollen by the exposed mucous membranes, the dosage cannot be exactly controlled and constitutional symptoms are more difficult to avoid.

Because of the foregoing considerations it is obvious that unpleasant, not to say dangerous, constitutional reactions will be more difficult to avoid. The following procedure has been found useful in our hands:

1. The patient is classified as to sensitivity to the pollen extracts which are to be used in treatment in the manner described for pre-seasonal treatment.

2. The initial dose of that scheduled (Table II) for the class next below that of the patient's own classification is used as a starting point. The treatments are given daily and each dose is increased by 20 per cent over that of the preceding for the first five doses. The next five doses are given every third day, maintaining the same per cent increase as before. In this manner the tenth dose will be reached on the fifteenth day. After this time the dose interval may be increased to every fourth day as a precaution against reactions due to cumulative effects.

It is not to be expected that any dosage schedule can be rigidly and inflexibly adhered to. Marked local and constitutional reactions call for a reduction of the quantity injected to at least one-half that of the preceding dose and also for caution in increasing the subsequent doses.

"Rush" Desensitization.—This method advocated and practiced by Freeman[5] consists of giving injections of pollen extracts at intervals of one and one-half to two hours throughout the day. "The patient must go into a hospital, or some such institution, or at any rate he must be in the charge of a trained nurse and under constant supervision of the doctor . . ." He likens the "Rush" desensitization to the antianaphylaxis method of Besredka.[1]

This method is fraught with extreme danger. The only advantage offered by it is the element of time saved, and this hardly seems a sufficient reason for chancing the extreme dangers inherent in the method. A less intensive method is therefore to be preferred. If certain fundamentals are given consideration a gradual but safe increase in dosage can be maintained.

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THE CONTROL OF TUBERCULOSIS—ITS ECONOMIC AND SCIENTIFIC FACTORS*

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MEDIEVAL Europe knew that leprosy was communicable and that its spread could be stopped if contact with the sick person could be prevented. In 1313, Philip the Fair ordered all lepers burned. This drastic measure was not carried out. Instead the lepers were segregated in monasteries called lazarettos, of which there were 19,000 in Europe. In two hundred years leprosy almost disappeared.[9]

This represents Europe's first conquest of a pestilence and should give all of us who are attempting to control tuberculosis much food for thought. Perhaps by considering what has happened to tuberculosis in the last two hundred years, we can better evaluate what we are learning today and better plan our future program.

In 1741 it is estimated that 1 in 5.5 deaths[7] in London was due to tuberculosis. About this time machinery was introduced in industry, and its use brought about a rather abrupt shift in the population from the country to the town, with the resultant over-crowding of people and an exploitation of labor, particularly of children, who were often forced to work twelve to fifteen hours a day at starvation wages. This condition was accompanied by an increase in the ratio of deaths from tuberculosis so that by 1799 it is estimated that 1 in 3.8[7] deaths was due to this disease (Table 1). London at this time was a veritable labyrinth of squalor and destitution. The principal thoroughfares were, for the most part, unpaved and full of mud puddles and filth, while the alleys and courts were inhabited by a vast fraternity of social outcasts so that contamination and disease flourished. Conditions became so intolerable that legislation was enacted to curb the exploitation of labor and to improve living conditions. In the next sixty years the ratio of tuberculosis deaths fell to 1 in 8. In the next fifty years, or by 1910, the deaths from tuberculosis were further reduced in England to 1 in 10. This last reduction when figured on the basis of population represented a 50 per cent decrease per 100,000.[3] In the United States, the death rate from tuberculosis in New York City in 1851 was 469 per 100,000 while in 1930 it was only 73. In the registration area, the death rate was 201 per 100,000 in 1904 but in 1932 it was only 63. In Minnesota in 1932 only 1 death in 25 was due to tuberculosis.

TABLE I. DEATH RATE IN TUBERCULOSIS

Year	Place	Ratio of Tuberculous Deaths to Total Deaths	Rate per 100,000
1741	London	1— 5.5	
1799	London	1— 3.8	
1860	England	1— 8	
1910	England	1—10	
1851	New York City		469
1930	New York City		73
1904	Registration area		201
1932	Registration area		63

The decline in the death rate from tuberculosis in the nineteenth century took place during the period when there was a marked increase in urbanization of the population following the industrial revolution. This condition in itself increases the opportunities of infection, and, if infection lowers one's resistance to subsequent in-

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fection, then tuberculosis mortality should have increased markedly during this period. Instead it decreased tremendously. Furthermore, history indicates very clearly that, as living and working conditions improve, tuberculosis mortality decreases, and when they are poor, such as during major depressions or prolonged wars, tuberculosis mortality increases. In this depression, however, the death rate continues to decline and in Minneapolis there were one hundred fewer new cases of tuberculosis reported to the Health Department in 1932 than in 1931. Also, according to Asher,[1] the tuberculosis death rate continues to decline in Germany in spite of the prolonged depression while the incidence of infection in adults remains high, 100 per cent, according to the tuberculin test. Apparently, then, the relief work carried on so far during this depression plus the enforced rest of so many adults has operated to increase man's resistance to tuberculosis. Infection is not prevented, but it is rendered harmless. There have been two very interesting interruptions of this continuous decline connected with wars. One occurred during the siege of Paris in 1870[9] and the years immediately following it. When normal living conditions were reëstablished, the death rate returned to normal. The second interruption occurred in Europe following the World War. Again when normal conditions were reëstablished, the death rate began to fall and it has been declining ever since.

Thus the first great cause of the decline in the tuberculosis death rate in the last two hundred years is probably economic. Certainly if rest and adequate food are effective in the treatment of tuberculosis, it follows that reducing the strain and providing adequate food for the person in industry should increase his resistance against whatever infection he may have, be it little or great.

Also Dublin[6] reports that in 1930 the death rate from all forms of tuberculosis among the industrial policy holders of the Metropolitan Life Insurance Company was 81.3 per 100,000 in contrast to 17 per 100,000 among those economically able to carry individual policies of $5,000.00 or more. Because of this, Dublin claims that, by and large, tuberculosis is rapidly becoming a minor cause of death in all but the industrial groups, and even in that group the decline in the death rate in the last twenty years has been greater (64 per cent) than for the nation as a whole (52 per cent), or for any other major population such as the rural group (41 per cent). Curiously enough, the industrial group exposed to silica dust, a substance which lowers the individual's natural resistance to tuberculosis, has a higher tuberculosis death rate than the group with the greatest exposure to infection, such as physicians and nurses. Another group having high rates consists of the common laborers, where the work is hard and the pay low.

Osler's[12] parable of the sower illustrates the influence of resistance or "the nature of the ground upon which the seed falls. *'Some seeds fell by the wayside and the fowls of the air came and devoured them up,'*—bacilli scattered broadcast outside the body, an immense majority of which die; *'some fell on stony places'*—bacilli that find lodgment in many of us with the production of a small focus, but nothing comes of it; they wither away because they have no root; *'some fell among thorns and the thorns sprang up and choked them'*—cases of tuberculosis, latent or active, in which the seed finds the soil suitable and grows, but the conditions are not favorable, as the thorns, representing the protective forces of the body, get the better in the struggle; *'but others fell on good ground and sprang up and bear fruit an hundred fold,'* representing the 54,435 who died of the disease in 1909 in England—the soil suitable, protecting forces feeble."

The second great cause of the decline in the death rate from tuberculosis is scientific and lies in the reduction of the opportunities of infection in the general population due to (1) hospitalization of the tuberculous; and (2) pasteurization of milk and eradication of tuberculosis from our herds as a result of our cattle testing program. "These two forces reduce the amount of tuberculosis and deaths in accordance with the laws which govern communicable diseases. Take away the seed, thus thinning out the seeding, and the disease diminishes."

The influence of hospitalization on this part of the control program is well illustrated by the following. Hospital facilities for the tuberculous were begun in England in 1791, and by 1884 England had 7,000 beds for this purpose. Between 1838 and 1900 the death rate dropped 66.7 per cent while between 1884 and 1900 it dropped 22.4 per cent in London alone. Sanatorium treatment was begun in Germany in 1854, and between 1869 and 1900 the death rate dropped

TABLE II. EFFECT OF HOSPITALIZATION ON THE DEATH RATE IN TUBERCULOSIS

Place	Hospital or Sanatorium Facilities	Year	Death Rate per 100,000	Percentage Increase	Percentage Decrease
England	Began in 1791 (7,000 beds by 1884)	1838	399		
		1900	133		66.7
London		1884	312		
		1900	242		22.4
Germany	Began in 1859	1869	353		
Berlin		1900	267		24.3
France	Three small hospitals prior to 1901				
Paris	First large Sanatorium in 1905	1884	519	4.9	
		1900	546		
United States	Began in 1881 (increased rapidly)	1884	445		
New York		1900	301		32.4

24.3 per cent in the city of Berlin alone. New York began its hospitalization for the tuberculous in 1881, and between 1884 and 1900 the death rate had fallen 32.4 per cent. While the death rate was declining in these communities, it rose 4.9 per cent in Paris, where there were only meager sanatorium facilities[8] (Table II).

The life history of the tuberculous individual can be divided into two broad phases: the period before he becomes infectious and the period after he has become infectious. In any program dealing with the control of tuberculosis one must decide whether he will concentrate on the first, or second, or include both phases of the individual's life. Because of the marked advance made in the diagnosis of tuberculosis by medical science in the nineteenth century, it seemed very logical to the founders of the National Tuberculosis Association to concentrate on the first phase. They thought if the active cases could be found before they became infectious and restored to health by means of sanatorium treatment that the chain of infection would be broken and in time tuberculosis would automatically disappear. To that end the building of sanatoria was encouraged until in 1931 there were 633 institutions in the United States with 80,054 beds for the tuberculous.

The difficulties in carrying out that plan were: (1) the universality of tuberculous infection in adults; (2) the fact that only a small proportion (1 to 10 per cent) of those infected ever develop tuberculosis; (3) the difficulty in selecting the exact point or the time in which infection passes from infection only, to disease. This process is so insidious that the majority of cases are advanced before they are discovered. For instance, only 9 per cent of those with pulmonary tuberculosis admitted to Glen Lake Sanatorium since it opened have been in the early stage. If our experience can be considered indicative of general conditions, then the majority of patients admitted to our sanatoria are in the open, infectious group.

Thus it would seem wiser to follow Koch's suggestion made in 1906 when he recommended that the policy Norway used in controlling leprosy be followed in the control of pulmonary tuberculosis. "There (in Norway) they have not isolated all of the lepers but only a fraction of them, including first just the most dangerous, and the result has been that the number of lepers, which in 1856 amounted to nearly 3,000, has now (1906) gone down to 150. This is the example to be followed in pulmonary tuberculosis, and, if all of the cases of pulmonary tuberculosis cannot be provided for, at least as many as possible, including the most dangerous, that is to say, those in the last stages of the disease, ought to be lodged in hospitals."[13]

If Koch's suggestion is correct, then any community which has provided ample sanatorium facilities should have a more rapidly declining tuberculosis death rate than other similar communities with less ample facilities. In 1927, when our present sanatorium capacity was reached, Minneapolis had 2.25 beds per death, but the declining death rate since then now gives us 3.6 beds per death (Table III), while the State as a whole, including Federal facilities, has a little over 2.5 beds per death for the tuberculous. In 1916, the year the Sanatorium was opened, the tuberculosis death rate in Minneapolis was 38.6 per cent greater than for the

TABLE III. RATIO OF BEDS TO DEATHS FROM TUBERCULOSIS

Year	Beds	Deaths	Ratio
1916	230	521	.44
1927	760	337	2.25
1932	760	207	3.6

TABLE IV. DEATH RATE

Locality	1916	1932	Reduction (per cent)
Minneapolis	147.14	42.97	70.79
State	106.07	40.65	61.67

State as a whole but in 1932 it was only 5.4 per cent greater (Table IV). Thus the tuberculosis death rate is declining faster in Minneapolis, the largest city of the State, than in the entire State in spite of the fact that tuberculosis is notoriously a disease of the cities rather than of the rural section.

The incidence of teen age tuberculosis in Minneapolis is very low, as is seen by the fact that 26, or 5.35 per cent, of the 486 tuberculous individuals admitted to Glen Lake Sanatorium in 1925 were between the ages of fifteen and nineteen while only 12 or 2.5 per cent of the 470 tuberculous individuals admitted in 1932 were in this same age group. Also, the death rate of individuals from fifteen to nineteen years of age is much lower in Minneapolis than for the registration area (Table V). For instance, in 1920 the tuberculosis death rate in Minneapolis for males in this teen age group was only 24.7 per 100,000 or about 35.3 per cent of that for the registration area.[11] The death rate for females in Minneapolis in this age group was 70 or about 53.2 per cent of that for females in the registration area. A decade later, in 1930, the death rate for males in Minneapolis in that age group had dropped to 10.8 per 100,000 or 29 per cent of that of the registration area while the death rate for females in that age group had dropped to 13.5 or about 20 per cent of that of the registration area (Table VI). Thus in the decade which coincided with the increase in the capacity of the Sanatorium from one hundred to seven hundred beds the already existing favorable ratio of deaths from tuberculosis in the teen age group in Minneapolis as compared with the registration area of the United States was increased.

Drolet[4] reports that the death rate of infants in New York City in 1923 was only one-twelfth of what it was in 1868, and that the death rate for children under fifteen years of age has declined from 136 per 100,000 children in 1898 to 20 per 100,000 children in 1931.[5] He believes that the segregation of the advanced case is the chief cause of this marked decline and claims that the death rate from tuberculous meningitis and the total number of cases segregated in institutions are in obvious correlation. He believes also that the activities of the Health Department such as the systematic disinfecting, cleaning and renovating of the former homes of the consumptives, the pasteurization of milk and the examination of all food handlers are very important contributing factors.

If the experience of Norway and medieval Europe with leprosy, the early experience of London, Berlin, New York and Paris with tuberculosis and the experience of New York City in the twentieth century as cited by Drolet can be considered as an indication of cause and effect, then the more rapid decline in the tuberculosis death rate in Minneapolis as compared with the State as a whole and the lower incidence of teen age tuberculosis in Minneapolis as compared with the registration area is just what one would expect from the ample sanatorium facilities which the community has provided. It proves beyond a peradventure of a doubt that such facilities are worthwhile and that they more than pay for themselves.

But providing ample sanatorium facilities and depending upon the education of the public concerning the symptoms of tuberculosis are not enough. In the first six months of 1933 in the State of Minnesota,[2] 48 per cent, and in the city of Minneapolis, 50 per cent, of the deaths from pulmonary tuberculosis were either reported by death certificate alone or occurred within five to six months after the first registration. Apparently, then, it is necessary if we really wish to control tuberculosis to go out after the cases and thus cover both phases of the consumptive's life. In searching out the cases we should center our program about five groups: (1) the industrial; (2) the family; (3) the contacts of those who have died from tuberculosis; (4) the school; and (5) the family physician. The first three plans

TABLE V. TUBERCULOSIS MORTALITY FOR YOUNG MALES AND FEMALES
Registration States of 1900, 1900-1930

Year	15-19 Years			20-24 Years		
	Rate per 100,000 population		Percentage excess of female over male rate	Rate per 100,000 population		Percentage excess of female over male rate
	Male	Female		Male	Female	
1900	124.1	177.7	43	249.7	265.8	6
1910	111.1	133.0	20	190.9	204.0	7
1920	79.0	131.6	67	137.9	179.4	30
1930	37.4	67.3	80	76.6	103.6	35

TABLE VI. DEATH RATE IN AGE GROUP 15-19 YEARS OF AGE PER 100,000 POPULATION OF THAT AGE GROUP

Year	Males			Females		
	Registration Area	Minneapolis	Per cent	Registration Area	Minneapolis	Per cent
1920	79	24.7	35.3	131.6	70	53.2
1930	37.4	10.8	29	67.3	13.5	20

start from the known case and proceed to the contacts. The fourth plan starts with the contacts and leads to the unknown case. In that connection, Harrington[12] reports that 26 per cent of the cases of adult tuberculosis now registered with the Minneapolis Health Department have been discovered through following up contacts of infected school children. Furthermore, the school surveys indicate which children are infected and which children will, therefore, need further supervision in order to detect as early as possible the tuberculosis which will develop in 1 or 2 per cent of them. The fifth plan consists of making the family physician so tuberculosis-conscious that he will give every one who consults him medically an examination for tuberculosis including the skin test and the x-ray. In a comparatively short time the entire population would be quietly and effectively examined by this method.

If tuberculosis could be looked for in this manner, the aim of the National Tuberculosis Association, namely, the discovery of the early case, as well as the earlier discovery of the advanced case, will be accomplished.

So far we have talked merely about the reduction, through hospitalization, of the opportunities for infection. Another very important side of hospitalization is that of the treatment of the individual patient. To those of us who have had tuberculosis or who deal with people with tuberculosis, this is very important for reasons which are apparent to all. It is essential that those who are conducting this treatment be familiar with its newer aspects, that they have a keen appreciation of the value of rest, both general and local, because the majority of consumptives who have died have at some time or other in their lives been suitable cases for collapse therapy. Manifestly it should be the duty of every phthisiotherapist not to let that period pass without grasping the opportunity. By means of this type of treatment many lives are saved and lesions which have been infectious are rendered harmless. How well this plan works is illustrated by conditions in Chicago, where approximately six hundred individuals who cannot be hospitalized because of lack of room are receiving collapse therapy and approximately one-quarter of them have been rendered non-infectious. Thus in addition to restoring the indivdual to health this type of treatment has rendered some harmless.

When Koch announced the discovery of the tubercle bacillus, the scientific world, encouraged by the success of the vaccine against smallpox,

chicken cholera, anthrax and hydrophobia, began an enthusiastic search for a specific for tuberculosis either through the use of drugs or some type of vaccine or serum. The longed-for specific has not yet been found but the search still goes on and in time tuberculosis should yield its complete secret.

Koch, however, in his search for a specific, discovered that experimentally a mild infection increased the laboratory animal's resistance towards subsequent infection. This fact has been confirmed by every worker in experimental tuberculosis since then. At first, it was known as Koch's phenomena, but, since the time of von Pirquet, it has been called allergy.

The cry of the world for a specific, forced Koch to announce, against his better judgment, that in tuberculin he has found the sought-for cure. Experience has not borne out his claim, and, today, tuberculin is used chiefly to indicate those individuals who are infected and who are therefore in need of further study. A repeated negative reaction probably indicates that the individual is not infected with the tubercle bacilli or if he is then certain conditions are interfering with the reaction. Thus tuberculin has a very definite place in our diagnostic armamentarium.

Because of this, one of the first activities of the Medical Research Committee, which had been appointed by the National Tuberculosis Association in 1920 to coördinate research in tuberculosis, was to investigate the method of manufacture and use of Old Tuberculin. Investigations soon revealed that there was no uniformity in the manufacture of Old Tuberculin. It was obvious, however, that there must be a single substance which was responsible for the skin test. This substance was finally isolated by Seibert and Long. Upon comparison with Old Tuberculin, it was found to be a more potent testing substance. After nearly seven years of work an agreement has finally been reached between the manufacturers, the Bureau of Animal Industry, the U. S. Public Health Service and also tentatively with the National Research Council of Great Britain concerning the advantages of a uniform testing substance which can be diluted quantitatively for use in tuberculin skin tests. It is hoped that, in a very short time, final steps will be taken in providing such a standard substance for general use.[14] It is hoped that Old Tuberculin in its various strengths will gradually be discontinued although there is no suggestion that any physician who wishes to continue the use of Old Tuberculin should not do so. Probably only when a standard substance is used by all physicians will epidemiological studies be comparable for statistical purposes.

Another very valuable diagnostic aid is the x-ray discovered by Roentgen in 1895. Because of its ability to pick out areas of tuberculous pathology before they can be detected by physical examination, the x-ray has become a very important instrument in the early discovery of tuberculosis. When this was investigated by the Medical Research Committee, a wide difference in the manufacture and use of x-ray equipment was discovered. This difference includes variations in the component parts of the x-ray machine itself, in the type of electric current used and the type of film on which the shadows are portrayed. After five years of study in this field, the work had progressed far enough for Mr. Warren of the Moore School of Electrical Engineering in Philadelphia to make a survey of the equipment and technic used in various sanatoria last summer. In this study twenty-five institutions were visited, and Mr. Warren offered valuable suggestions as to how their present equipment could be improved in the light of researches which had been carried on. When finally correlated, the results of this survey should be of great value in establishing a uniform standard of x-ray manufacture and technic of operation.

Plans for the Future

The marked decline in the death rate for the past two hundred years suggests that we are within striking distance of the eradication of tuberculosis, provided we learn the lessons which these years should have taught us, and apply them intelligently. The first lesson is that tuberculosis decreases as man's working and living conditions improve. Therefore, we should continue to improve his economic status and thus increase his resistance towards tuberculosis as well as reduce his opportunities of infection. The second lesson is the value of ample sanatorium facilities. It follows that the earlier the tuberculous individual is hospitalized or modern treatment begun in the home, the better are his chances for recovery and the greater is the protection afforded the community. Therefore early diagnosis is imperative.

The experience of the last twenty-nine years indicates very clearly that early diagnosis is not made by passively waiting for the individual to consult a physician. It can be made only by going out after the cases. How are we to do this? There are two general methods: (1) to make the public tuberculosis-conscious by surveys of industrial groups, the family group, the school child and the contacts of those who have died from tuberculosis. The second method is that of educating the physician rather than the public. He is the natural guardian of public health and as such occupies a key position in any health program. If we can so educate him that he will apply the tuberculin test to every one who consults him and then x-ray the positive reactors,* the results will be astonishing. The results of this plan would be even more effective if we could persuade the general public to have an annual medical examination. Such a plan brings each individual physician into the picture in a much more intimate way than the group survey plan could.

Until the long sought for specific is found, the crux of the tuberculosis program for the future is an intensive search for the open case with prompt hospitalization and effective treatment, thus removing the focus of infection and so protecting the public. Medical research should continue for two purposes: (1) the improvement of our present methods of diagnosis and treatment; and (2) the continuous study of tuberculosis until its complete secret is discovered.

Only through the combination of clinical and scientific research can we hope to control tuberculosis.

*Since preparing this paper I have been impressed with the number of adults who have symptoms of tuberculosis with positive x-ray and acid-fast bacilli in their sputum, who are negative to the intradermal tuberculin test in the usual dose. Therefore, I believe that as far as adults and teen age individuals are concerned, it is far safer to x-ray every one with symptoms, even though the tuberculin test is negative, rather than to wait for manifest disease to develop before further studies are made. This may cost the individual a little more than the other plan of x-raying only the positive reactors, but it will avoid many heartaches and tragedies.

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THE SURGICAL TREATMENT OF PULMONARY TUBERCULOSIS*

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THE past few years have witnessed a decided change in our treatment of pulmonary tuberculosis, because of a better understanding and wider acceptance of special surgical methods of treatment gradually developed during the past few decades. This intrusion by the surgeon into the tuberculosis field, formerly a strictly medical domain in which any surgical intervention was frowned upon, has meant the rehabilitation of a large number of patients with advanced tuberculosis, otherwise doomed to a chronic invalidism, and has been the means of converting many an otherwise hopeless consumptive into a hopeful, fighting tuberculous individual.

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Lest anyone foster the notion that there is great conflict between the medical and surgical treatment of pulmonary tuberculosis and thereby waste valuable time attempting to find out which is the more valuable, let me state here specifically that there should be no such conflict between the phthisiologist and the surgeon in the treatment of this disease. Each method has its place and very frequently it is only by a combination of the two that the desired end-results can be obtained. Neither medicines nor surgical operations cure pulmonary tuberculosis unaided. The medical regime of prolonged intensive rest, hygienic living, good food, actino-therapy, symptomatic control, etc., properly applied, favors healing by assisting the patient to build up his bodily resistance against the tuberculous disease and by reducing to a minimum any trauma which might help spread the process. Surgical procedures are mechanical methods designed to correct mechanical difficulties which are interfering with or handicapping the patient in his attempt to control the disease. A combination of the two types of treatment is the ideal procedure and will rehabilitate far more individuals, particularly in the advanced group, than will either method alone.

Probably no disease offers a more fruitful field for coöperative medical effort than does advanced tuberculosis with its complications. Coordinated work between the internist, phthisiologist, roentgenologist, laboratory worker and the surgeon is not only desirable, but should be almost mandatory. The internist frequently knows tuberculosis from a distance only. The phthisiologist is often at sea as far as the technical side of surgery is concerned. The roentgenologist deals with shadow pictures rather than living beings, while the surgeon all too frequently fails to appreciate the reaction of the tuberculous individual to operations and traumatizes his patient too much, with disastrous results. No surgeon who has not lived with tuberculosis or dealt with it intensively can ever quite appreciate the problem or, without proper guidance from a group, ever reach maximum efficiency in this field. If any one of the group must dominate the picture, let it be the phthisiologist with modern training and thorough knowledge of the patient and his reactions, rather than the ambitious surgeon who wishes "to give everyone his chance" or the timid internist who hesitates to take any chances or accept the responsibility for suggesting anything radical. Surgical treatment for pulmonary tuberculosis should, as a rule, be preceded by medical management of the disease, utilizing operation as a supplementary procedure to correct some mechanical difficulty and following it with a continuation of the medical regime until the desired result is obtained.

Intensive sanatorium treatment for pulmonary tuberculosis favors the healing of the disease in two ways: (1) by building up the patient's general bodily resistance by hygienic methods; and (2) by reducing through bed rest with suitable posture, etc., the physiological activity of the diseased organ. If, within a reasonable length of time, it becomes evident that the patient is obtaining the desired results under this regime and no complications intervene, then nothing further is necessary except perseverance in this program until an arrest is obtained and confirmed. There are no real shortcuts. The healing of a tuberculous focus is a slow process in which the time element is an extremely important factor. If, on the other hand, it becomes apparent at any time that the patient is unable to handle his tuberculosis under the above regime either because of its extent or, as more usually happens, because of the occurrence of the complications of pulmonary cavitation or hemorrhage, some mechanical help becomes necessary if the individual is to be saved.

The surgical methods employed in the treatment of this disease are mechanical procedures directed either against the lung itself or the respiratory mechanism which activates the lung. The effect upon the tuberculous process and its complications is brought about in two ways: (1) by a relative reduction in physiological function of the lung to afford rest to the diseased area; and (2) by a mechanical reduction in lung volume or compression to close cavities and control bleeding vessels. The secondary effects of alteration in intrapulmonary blood supply and lymphatic flow and their influence on intrapulmonary fibrosis, though important in the healing of a tuberculous process, cannot be considered in this brief review. The surgical procedures directed at the lung itself include: artificial pneumothorax, intrapleural and extrapleural pneumolysis. Those directed against the respiratory mechanism activating the lung include operations upon the phrenic nerve, scalene

muscles, intercostal nerves and the ribs. Each will be considered separately.

Artificial Pneumothorax

Artificial pneumothorax, in which the lung is collapsed to a variable degree and its activity reduced by the repeated injection of air into the free pleural cavity, is our simplest, most flexible, most controllable and, withal, our most valuable type of collapse therapy. It is essentially a bedside procedure, traumatizes the patient but little and may be undertaken no matter how ill the patient may be if suitable indications are present. Reduced to its simplest terms it means the insertion of a needle through the chest wall into the pleural space under local anesthesia and the repeated injection of air in amounts sufficient to collapse the lung gradually to the position necessary to control symptoms and collapse cavities. Profuse pulmonary hemorrhage may demand rapid collapse. This optimum collapse is then maintained by a proper regulation of time interval and size of refill. In this manner symptoms, both toxic and local, may be rapidly controlled with marked benefit to the patient. The treatment should then be continued until sufficient time has elapsed to permit healing of the tuberculous focus, a period of a few years in the earlier lesions, extending to life in the more advanced destructive types of process.

The successful establishment of a pneumothorax depends upon the absence of firm limiting adhesions between the visceral and parietal layers of pleura in the region of the lung lesions. It is the method par excellence for the treatment of patients with acute disease, those who are extremely ill or in poor physical condition, as well as for those with profuse or repeated pulmonary hemorrhage. Because the collapse obtained is within the control of the operator, it is also the method of choice in the treatment of the patient who has active disease in the contralateral lung. It is possible with this method to obtain as much as 90 per cent collapse of the lung, far more than with any other type.

The chief disadvantages of pneumothorax are: the necessity for a continuation of the treatment over a considerable period of time; the financial outlay involved; the appearance of a clear pleural effusion of greater or less extent, in more than half of the patients taking the treatment; and the occurrence of tuberculous empyema, a more intensive process of the same etiology, which occurs in approximately 10 per cent of patients in whom the pneumothorax is started for extensive exudative lesions. The advantages outweigh the disadvantages to such a degree that we rely upon it as our first resort where collapse therapy is indicated and at the present time have 34.6 per cent of the 578 patients with pulmonary disease in the sanatorium under this type of treatment.

The results, which are difficult to evaluate in figures, vary from the miraculous to the disappointing, depending upon the extent and position of the collapse obtained. From figures obtained by comparing the results in a group of patients started on pneumothorax with a similar group of patients presenting similar indications where pneumothorax was not attempted or was unsuccessful, pneumothorax may be estimated as offering the patient two or three times the chances of recovery that he has without such collapse. It is to be remembered that the treatment itself does not cure the disease, though it aids materially. Its use in combination with constitutional treatment, bed rest, etc., is essential if the best possible results are to be obtained, particularly if the patient was originally afflicted with extensive disease or really in serious need of collapse therapy.

Bilateral Pneumothorax

A certain limited number of patients suffering from bilateral tuberculosis, especially those who during the course of unilateral pneumothorax have developed an extension of the process into the contralateral lung, may be successfully treated by bilateral partial compression. Bilateral pulmonary tuberculosis *per se* does not indicate bilateral collapse, although occasionally it has been so undertaken. The best results have been obtained in the group in which, at some time after the institution of the original pneumothorax, partial collapse of the contralateral lung has become necessary because of increasing disease or cavitation. Technically, the procedure requires a much more careful regulation than does unilateral pneumothorax because of the patient's diminished respiratory reserve and the necessity for maintaining a proper balance between the two sides, especially in the presence of a flexible mediastinum. Institutional treatment with careful frequent fluoroscopic control is essential, particularly in the early stages and until the treatment becomes stabilized. At times this balance is so extremely delicate and difficult to maintain that it limits the use of this type of

treatment to the hands of those with considerable experience in artificial pneumothorax work. Approximately 8 per cent of our pneumothorax patients at Glen Lake are at present on bilateral simultaneous collapse. The results to date, in a series of over eighty so treated, while not as good as those obtained with unilateral pneumothorax alone because of the extent of the tuberculosis with which we have to contend, still prove it to be of definite value and well worth the effort. Over 50 per cent of the patients so treated are still alive, some for periods of eight or nine years following the institution of the treatment, and a number have been returned to work.

Intrapleural Pneumolysis

Effective pneumothorax may be prevented by three types of adhesive conditions within the chest: (1) extensive short, dense pleural adhesions which prevent effective pneumothorax, the air introduced, if free pleural space is found at all, being limited to isolated pockets; (2) broad and thick adhesions, often containing lung tissue, which hold out cavities or other diseased areas of the lung even when the remainder of the lung is effectively collapsed; and (3) localized single or multiple strings or bands of small diameter, or thin sheets usually of some length, which prevent effective collapse.

This first group with extensive short adhesions presents no surgical possibilities.

The second group offers little chance for surgical intervention unless the peripheral attachment is so localized that the parietal pleura about it may be excised as a button and dropped free into the pleural cavity, a procedure which is rarely possible. Section of such adhesions containing lung tissue almost invariably results in empyema due to the Koch bacillus and secondary organisms introduced by cutting through infected tissue. A few of this group have been handled successfully by wide open thoracotomy with manual compression of the cavity and the adjacent lung without section of the adhesion. The field for this procedure is extremely small.

The third group affords greater possibilities for surgical interference. Before operation is undertaken, however, a reasonable attempt should be made, by gradually increasing the artificial pneumothorax under adequate control, to stretch out these adhesions and see if adequate collapse cannot be obtained. A large number of adhesions of this type may be gradually extended without rupture and satisfactory collapse and control of symptoms obtained, if sufficient patience is exercised. If after a period of time the cavity or symptom-producing area is not controlled by gentle increase in the pneumothorax in an attempt to stretch these adhesions, then surgery may be used to distinct advantage. These adhesions should be sectioned close to the chest wall to avoid cutting through lung tissue. Thorough coagulation is necessary to provide adequate hemostasis and prevent postoperative intrapleural hemorrhage. Section of adhesive bands may be accomplished in one of two ways: (1) by the open method of thoracotomy, using a wide intercostal incision with ligation and cauterization of the adhesions under direct vision and control, or through a minor thoracotomy incision, the O'Brien type of procedure, in which, through a small opening, the adhesion is picked up, coagulated and sectioned under direct vision; or (2) by the closed method of intrapleural pneumolysis in which a thoracoscope is introduced into the pneumothorax cavity and the adhesions visualized. Then through a separate cannula inserted under local anesthesia, the galvano cautery blade or, better still, the endotherm tip is brought into contact with the adhesion at the desired point, where it is coagulated and then sectioned. The closed method is unquestionably the safer of the two, though technically somewhat more difficult and involving such a financial outlay for proper equipment as only large institutions with a considerable volume of material can afford. The field for intrapleural pneumolysis is relatively small, probably not over 10 per cent of artificial pneumothorax patients.

Extrapleural Pneumolysis

Extrapleural pneumolysis, *i.e.*, the stripping of the parietal pleura from the inside of the chest wall along the plane of the endo-thoracic fascia and the placing of a pack of some material into the pocket thus formed, may be used to advantage in a very limited group of tuberculous patients presenting localized cavities, usually apical, a firmly obliterated pleural space and the lower portion of the lung relatively free of disease. The pleural cavity must be firmly obliterated or the pack tends to shift and allows the cavity to expand at a later date. The cavity must not be of a peripheral type with a very thin lateral wall, or necrosis of the lateral wall may occur, allowing the pack to enter the cavity itself and serious

infection to develop in the extrapleural pocket. Packing materials of various types have been used, including paraffin, wax, gauze, rubber, bone, muscle, fat and mammary tissue, but as yet the ideal packing material has not been found. Fat and other free transplants tend to break down and become easily infected. Muscle and some of the other tissues tend to atrophy and allow the cavities to reopen. Paraffin and other foreign filling material provoke a large amount of exudate, which predisposes to infection, and have a tendency to migrate if the pleural cavity is not very densely obliterated, permitting subsequent reopening of the cavity. If perforation into the cavity occurs, the paraffin may be aspirated into other lung areas with subsequent abscess formation. The field for extrapleural pneumolysis at the present time is small but the procedure does offer certain possibilities of usefulness not altogether met by other methods.

Collapse Procedures Directed Against Respiratory Mechanism

Diaphragmatic Paralysis.—Diaphragmatic paralysis is induced in the treatment of pulmonary tuberculosis in order to obtain some reduction in lung volume on the diseased side and some restriction of physiological activity in the lung. It is brought about by an interruption of the phrenic nerve on the corresponding side in either a temporary or permanent manner, depending upon the design of the operator. Temporary paralysis of the diaphragm (phreniphraxis) is induced usually by pinching of the nerve and all accessory branches and, less frequently, by alcohol injection or section and resuture. It persists, as a rule, for approximately five and one-half months, but severe crushing may induce a longer paralysis or, occasionally, a permanent one. Permanent interruption of the phrenic nerve is produced either by excision of a centimeter or more of the main trunk of the phrenic and all accessory branches (phrenicectomy), or, more usually, by an avulsion of the distal segment of the trunk from the site of exposure (phrenic exeresis). A reduction of lung volume, 30 per cent or less, occurs, with a relative reduction in physiological activity. We have occasionally used an intermediate procedure and have sectioned the nerve and turned back the proximal end, thus preventing regeneration but still leaving at least the theoretical possibility of resuture and a return to function at a later date if desirable. In these instances, as well as in all temporary interruptions, we have followed Alexander's technic and left a black silk thread about the nerve to facilitate finding it subsequently. We much prefer doing a temporary interruption and repeating it two or three times if necessary, to performing the radical exeresis, particularly in the case of a patient with limited upper lobe disease. Even though radical operation on the upper lobe is later necessary, a functioning lower lung affords greater respiratory reserve and working capacity than would be present with the diaphragm paralyzed. The paralyzed diaphragm rises into the chest to a variable degree depending upon the relation between intrapleural and intra-abdominal pressure and the presence or absence of limiting lateral adhesions. Active motion ceases, to be replaced by a paradoxical motion which at times may even approach the extent of the normal excursion. While the average postoperative rise of the diaphragm is between two and four centimeters, we occasionally encounter an excessive elevation, even to the level of the second rib on the left side and the third on the right.

Phrenic nerve surgery has become our second resort procedure in the collapse therapy field. It is utilized in those patients who are unable to take artificial pneumothorax because of obliteration of the pleural space and who are either not in condition for the more radical extrapleural thoracoplasty or do not, at the moment, present the proper indications for it. Thus we use it in extensive lesions requiring collapse of some sort, in an attempt to control profuse or repeated pulmonary hemorrhage, or a preparatory preliminary to thoracoplasty to help the patient until he is in suitable condition for the more radical procedure. A small group of pneumothorax patients presenting adhesions between the lung and apical pleura and the lung and the diaphragm, but without firm lateral fixation, may be definitely helped by diaphragmatic paralysis, the release of longitudinal tension permitting better collapse above. It has been suggested as a preliminary operation to test the competency of the contralateral lung prior to thoracoplasty and also as a prophylactic to prevent aspiration of material into the base during and following an upper thoracoplasty, but in both it has failed to meet expectations.

Probably three-quarters of the patients will show some symptomatic improvement such as reduction in cough and expectoration, diminution

in toxic reaction, increased facility in raising the sputum, cessation of pulmonary hemorrhage, etc., following this diaphragmatic paralysis. A smaller number present increased difficulty in expectoration; others gastro-intestinal distress with flatulence and upper abdominal discomfort, more frequent following left-sided operations; and some, for a time at least, some difficulty in defecation caused by loss of intra-abdominal pressure on effort, due to the rise of the diaphragm. Occasionally we see almost miraculous results, with marked clearing of the tuberculosis and disappearance of large annular shadows in a relatively short period of time. However, not a few of these later relapse and subsequently require intervention of another type. Operation on the phrenic nerve is valuable in its place, but too much has been expected from it. It is probably the most abused of our collapse procedures at the present time.

Section of the Scalene Muscles.—Section of the scalenus muscles, the anterior, medius, and posterior, close to their insertion into the first and second ribs, has been suggested as an accessory procedure in the treatment of pulmonary tuberculosis in order to induce additional immobilization of the corresponding side of the chest. It may be accomplished quite readily through an extended phrenic incision. It should be remembered that scalene muscles are accessory muscles of respiration which on quiet breathing are brought into play little, if any, except as an upper support to the first and second ribs and through them to those below. While the bony chest wall remains intact, little can be expected from such a procedure in the way of collapse and the immobilization obtained can be readily duplicated by the proper application of weights or mechanical devices to the chest wall without operative interference.

Intercostal Neurectomy.—Section of the intercostal nerves posteriorly has been suggested as a means of obtaining immobilization of the corresponding hemithorax by paralysis of its activating muscles. As with the aforementioned procedure, I question whether the results obtained are sufficiently better than those readily obtainable by the judicious use of weights or mechanical compression to justify the sacrifice of function of the numerous muscles which this procedure entails.

Extrapleural Thoracoplasty. — Extrapleural thoracoplasty is a major surgical procedure which brings about both a compression and immobilization of the diseased lung by the wide excision of its rigid supporting rib structure. Its use is reserved to two classes of patients: those with extensive unilateral tuberculosis, chronic in type and massive in extent, usually with the complications of cavitation or hemorrhage, who have not recovered under conservative treatment and are unable to take pneumothorax because of an obliteration of pleural cavity; and a smaller group with tuberculous empyema where obliteration of the pleural pocket is necessary or desirable. It is a radical procedure for use where drastic methods alone will produce results. Collapse of the lung is obtained by a wide resection of ribs over the involved area, the extent of which is determined by the underlying pathological process, varying from a limited resection of the upper few ribs posteriorly, to a complete deribbing of the entire chest wall. Collapse of the lung and closure of cavities is obtained by this wide subperiosteal rib resection, while immobilization and reduction of physiological function of the lung is maintained permanently by fixation of the chest wall in the collapsed position by subsequent rib regeneration along the periosteal sheath. When once done, this process is irrevocable, hence the necessity for a stable or inactive lesion in the contralateral lung if any involvement whatsoever be present.

A proper choice of the patients for this type of operation is essential. Almost equally important is the choice of the proper time at which to operate on a given individual who presents all of the classical indications for the procedure, for unless the most favorable time is chosen in each particular individual, the risk may be very materially increased. The surgical procedure itself must be gauged to meet the individual patient's requirements rather than to fit any preconceived plan. Due care must be exercised not to traumatize the patient too much lest the tuberculosis become activated and either terminate the picture or produce a prolonged disability.

In practice, the more radical operations frequently prove the more conservative. The limited Wilms-Sauerbruch type of posterior thoracoplasty has very frequently given inadequate collapse, particularly when dealing with extensive lesions, large cavities or empyema pockets. The more radical Brauer subscapular type has proved more satisfactory, but even this not infrequently must be supplemented by antero-lateral

resection of the remaining segments of the upper ribs and cartilages in order to obtain closure of large apical cavities. Multiple stage operations here, as in other types of extensive operative procedures, have supplanted single stage procedures to a large extent, sacrificing some flexibility of the chest wall for the patient's safety. Care and gentleness in the handling of tissue has replaced the former mania for speed with its attendant excessive trauma, with consequent diminution of shock and better postoperative convalescence among the patients. In a similar manner, local anesthesia has been replacing the inhalation type to a considerable degree, particularly among the bad risk patients.

The operative risk for thoracoplasty procedures has been very materially reduced by careful coördinated effort between the various members of the group, and by attention to the points just mentioned, from an original widely quoted 10 per cent or higher to a figure which compares favorably to that obtained in other surgical fields. At present we have a series of 189 consecutive thoracoplasty operations on 83 patients without a single operative death, and but one late death at six and one-half months with a contralateral extension of the tuberculosis and a tuberculous meningitis. During this same period the field for thoracoplasty has been materially increased and many patients included who in the earlier days would have been considered unsuitable for surgical interference. Continued constitutional treatment for a considerable period following surgical interference is essential. Failure to do this may undo all that the operation has accomplished.

The field for thoracoplasty is yet small, probably 5 per cent of the patients admitted being suitable for such intervention, yet in the aggregate, the number of individuals thus affected becomes quite great. The results are most encouraging and are becoming more so. From a series of 205 thoracoplasty patients operated upon at Glen Lake Sanatorium from 1922 to date, 160 (78 per cent) are still alive, a considerably higher percentage than one should expect with the same patients without surgical interference. Our object should be not alone to save life, but to rehabilitate the individual if possible. Seventy-seven per cent of the discharged group have not only acquired control of their tuberculosis, but have been returned to work. These figures do not include the patients operated upon within the past twelve months, a period too short to permit such rehabilitation. Some of these individuals have gone as long as ten or eleven years since their operation and are still in good condition. Sixteen of these patients have been subjected to twenty-two major surgical procedures subsequent to their thoracoplasty for serious extrapulmonary pathological conditions, and all save one, a boy with a ruptured appendix and general peritonitis following a pneumonia, have come through with flying colors. Four have gone through pregnancy, one for the second time, without serious complications, a truly remarkable record when you consider the original condition of these patients and their general hopeless future without the surgical intervention.

Conclusions

Collapse therapy measures as a supplement to constitutional treatment for pulmonary tuberculosis have proved themselves of very definite value in aiding the individual who is unable to handle his tuberculosis alone. While most of them are specialized procedures of greater interest to those engaged in tuberculosis work, these measures should so challenge the interest of the whole medical profession that tuberculous individuals presenting suitable indications for their use may be offered the advantages of surgical treatment before the most favorable time for their use has passed.

Discussion

S. W. HARRINGTON (Rochester): It is a pleasure for me to discuss Doctor Kinsella's paper on the Surgical Treatment of Pulmonary Tuberculosis, because I am personally acquainted with the splendid work he is doing and because his views are very similar to mine in regard to the surgical treatment of these lesions. I wish to compliment him on the comprehensive and splendid presentation he has made of the subject.

I shall not go into detail concerning the various surgical procedures utilized in the treatment of pulmonary tuberculosis because Doctor Kinsella has covered this field very thoroughly. I shall confine my remarks to some of the fundamental principles underlying the surgical treatment of these lesions and I thoroughly agree with Doctor Kinsella that surgical intervention should be conservative and judicious. I should like to stress the fact that there is a definite place for surgical treatment in cases of pulmonary tuberculosis. This is evidenced by the constantly increasing number of patients who have been treated by various surgical procedures and I think there is no doubt but that surgery is one of the most important factors in the decrease of

the death rate and morbidity of this disease in the past two decades.

The chief problems concerned in the treatment of pulmonary tuberculosis are, first, to make the diagnosis early and, second, to institute immediate, adequate treatment. The basic treatment of the disease is rest, rigidly supervised and carried out in a sanatorium under a well regulated medical regimen, and in many cases in which the diagnosis has been made early, arrest of the disease can be affected by this conservative type of treatment. Unfortunately a large percentage of patients do not present themselves for examination early in the course of the disease and the diagnosis is not established until the lesions are fairly well advanced. In these more advanced cases, rest in bed often does not sufficiently quiet the lung to permit healing to take place. It is in this group that surgical intervention is indicated to give enforced rest to the diseased lungs by immobilization and collapse of the diseased tissues. It is impossible definitely to estimate the length of time that conservative measures should be carried out for this depends on the healing response in each case.

Surgical treatment should be instituted in cases in which a well regulated regimen in a sanatorium has been followed and in which healing has been slow. In any case in which conservative measures have produced adequate improvement, surgical procedures should not be considered merely to hasten the cure. However, they should not be delayed in cases in which there is no improvement in a reasonable time for often the simpler operative procedures will effect cure in the early cases which, if permitted to progress, would require much more extensive and hazardous operative treatment at a later time.

Selection of cases for surgical treatment demands the closest coöperation between clinician and surgeon. Cases should be selected for surgical treatment only after close study of the clinical progress of the disease. The type of cases most suitable for surgical treatment is that in which the process is proliferative or fibrous rather than exudative, for in the former two types encapsulation is taking place by the formation of fibrous connective tissue and this process will be greatly aided by surgical intervention. The present surgical measures are indirect types of treatment in which the diseased tissue is not removed. The chief object of all surgical procedures is to produce pulmonary collapse and to put the lung at rest. The collapse should be sufficient to promote drainage of existing abscess cavities and enough compression should be induced to produce approximation of their walls. This permits healing and the resulting fibrosis necessary to obliterate the lesions. There are many explanations for the general beneficial effects on the patient and the process of healing of the tuberculous lesions following collapse therapy; some of these explanations involve the question of immunity as well as that of mechanical compression of the pulmonary tissue. The latter produces lymphatic stasis and hyperemia in the quiet parenchyma of the lung. These factors are conducive to the growth of fibrous connective tissue which encapsulates the diseased portions.

The type of operation to be instituted depends on the findings present in each case. It was formerly thought that operation was advisable only in cases in which involvement was unilateral, but in recent years excellent results have been obtained in cases in which there was also a moderate amount of disease in the opposite lung. In many cases it is advisable to institute surgical measures which are temporary in effect and then to observe the results obtained. The subsequent course may indicate the advisability of reëstablishment of function of the lung or the institution of another form of treatment.

The clinical course of the disease can be closely followed by physical examination and by inquiry as to the subjective symptoms but knowledge of the condition is greatly aided by repeated roentgenologic examination of the lung. In those cases in which operation is instituted, roentgenologic examinations of the lung are of utmost importance, and may be deemed an absolute necessity, for it is only by this means that one can definitely determine the amount of pulmonary collapse which has been obtained, whether or not there are any obstacles to certain types of treatment, and what progress the lesion has made.

Artificial pneumothorax is the most common form of collapse therapy which is utilized and I like to look on it as the first line of surgical attack. Everybody who has treated many patients by means of artificial pneumothorax experiences the same pleasure and disappointment in the results obtained, for it is never possible to predict the result nor whether the collapse will be sufficient to control the symptoms. If it is not sufficient to control the symptoms, then other types of compression are to be considered. I believe one of the greatest questions in connection with artificial pneumothorax is when to discontinue the use of artificial pneumothorax on patients whose symptoms have been controlled by this procedure. We see many papers dealing with the indications for this type of treatment and the number of patients treated by it, but there are relatively few papers in the literature which deal with the indications for discontinuance of the treatment. This is undoubtedly explained by the facts that this method of treatment came into use so comparatively recently and that a sufficiently large number of cases has not been followed to allow any definite conclusions to be drawn. In my own cases, I have not felt justified in permitting the lung to expand in less than three years, and only then in cases of moderate severity. In the more severe cases which have been controlled by artificial pneumothorax, I have felt safer to keep the lung compressed for five years.

I agree with Doctor Kinsella that operations for interruption of the phrenic nerve are probably the most abused of all compression procedures at the present time. There is no doubt but that interruption of the phrenic nerve has a great field of application in treatment of tuberculous lesions, both as an operation complementary to other procedures and as an initial and sole operative procedure. It is probable that the marked beneficial effects that have been obtained in many cases have led us to expect too good an ultimate result in

the presence of more extensive involvement. These cases should be closely followed, for a false sense of security may be induced by the amount of improvement that follows interruption of the phrenic nerve. In some of these cases, later, the disease may extend or involvement of the contralateral lung may take place, which will make further surgical treatment by thoracoplasty extremely hazardous or impossible. In such cases the disease might not have progressed had the more complete collapse by thoracoplasty been done following the preliminary procedure.

Surgical collapse by rib resection is the basic treatment for the more extensive lesions, the situation and extent of the collapse depending on the location of the lesion and the condition of the patient. Because of the operative risk in these cases, and because of the importance of avoiding long, tedious, traumatizing operative procedures, these operations are best done in stages, never less than two, and as many more as are necessary to complete the operation safely for the patient.

I shall not go into discussion of any other surgical procedures to produce collapse. In closing I would like to stress one fundamental consideration of all surgical treatment of pulmonary tuberculosis: that is, the careful selection of the operative procedure that will bring about rest of the tuberculous lesion which is present, and this can be accomplished only by the closest cooperation between the clinician and the surgeon.

ECZEMA IN INFANCY AND CHILDHOOD*

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ECZEMA is a common disorder of the skin and, although it is composed of a number of dissimilar conditions that often are mixed or overlap, we are probably justified in our present lack of specific knowledge in grouping these clinical symptom-complexes as eczema.

Skin diseases in infancy and childhood differ from the adult for the following reasons:

1. The skin of infants is more delicate, has a higher water content, is less resistant to irritation, and more susceptible to infection.

2. The constitution of the child plays a greater rôle than in the adult and consequently there is a greater need of dietetic and environmental treatment.

3. Allergy plays a more important rôle in childhood, due to the greater permeability of the mucous membranes of the gastrointestinal tract to certain proteins.

4. Manifestations of mycotic and fungus infections are less evident.

5. Occupational eczema need not be considered.

My reason for discussing eczema in infancy, as such, is because it is one of the most common conditions a children's specialist has to treat. At no time in life is a clearer understanding of the underlying causes of this condition needed more than it is in infancy. Upon this, depends the successful management and treatment of the case. The "hit and miss" practice of applying ointment after ointment as, unfortunately, is so often seen, only leads to disappointment and failure; it increases the suffering of the infant, prolongs the disease and enhances the burden on the already apprehensive mother.

The pediatrician considers eczema not merely as a skin disease (as does a dermatologist), but as one of the manifestations of an exudative diathesis. By exudative diathesis we mean a constitutional condition characterized by a tendency to exudation in the skin and mucous membrane. In infants, in contrast to older children, it manifests itself by disturbances more in the skin and less in the mucous membrane.

In Infancy

IN THE SKIN	MUCOUS MEMBRANES
1. Seborrhea Capitis	1. Frequent digestive disturbances
2. Intertrigo	2. Frequent colds
3. Eczema	3. Frequent vaginitis and cystitis
4. Eczema Intertrigum	4. Tonsils and adenoids
5. Strophulus	5. Lingua geographica

These infants are constitutionally below par, and will not thrive in spite of a sufficient amount of breast milk. They respond peculiarly to infections and other disturbances and often have repeated digestive disturbances with frequent green stools.

At about one and one-half years of age a lull

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period occurs, when the skin symptoms usually disappear and we often feel that the infant has been cured, but are disappointed when in early childhood we find that the manifestations of this condition again begin to show themselves. Now they are more pronounced on the part of the mucous membranes and less on the skin. This is just opposite to what occurs in infancy.

Older Children

IN THE SKIN	MUCOUS MEMBRANES
1. Eczema	1 Frequent colds
2. Urticaria	2. Frequent tonsilitis
	3. Recurrent bronchitis
	4. Asthma
	5. Vaginitis
	6. Colitis

Eczema may be divided into three types: (1) seborrheic; (2) pruriginous; (3) mixed. It is important to recognize these distinct types in order to successfully diagnose and treat them.

Seborrheic eczema usually occurs in the first six months of infancy. It is accompanied by seborrhea of the scalp. The lesions predominate on the flexor surfaces and folds. Rarely is any eruption found on the face, but if present there it is of a dry type, being mostly on the forehead and extending down in front of the ears (merely an extension from the scalp). The lesions are composed of papules with greasy crusts, or confluent greasy crusts on a smooth, red, dry, or moist base. No itching is present. The patients are often in an improper nutritional state. However, the prognosis is good and relapses are rare. The cause is metabolic.

In the treatment of this and other types of eczema we must first consider the prophylactic measures of keeping the child cool and well powdered. No soap should be used and no wool clothing. This may often keep a latent eczema from becoming manifest.

Seborrheic eczema rapidly responds to proper dietetic and local treatment. In this form of eczema the dietetic treatment is much more important than the local treatment. First, the child must receive the proper amount of food quantitatively to cause proper gain in weight. Second, the child must get the proper qualitative diet to correct the underlying metabolic disturbance. This is accomplished by prescribing a diet low in fat and high in protein and salts. If breast fed, two of the feedings should be replaced by buttermilk mixture. If artificially fed, all the feedings should be of buttermilk or some other feeding low in fat and high in protein and salts.

Locally, one must remove the crusts with oil and apply a simple ointment, like zinc paste. Later 1 to 5 per cent Tuminol may be added. For the scalp, an ointment containing 2 per cent salicylic acid and 5 per cent sulphur works satisfactorily.

Pruriginous eczema, in contrast, to seborrheic eczema which comes in the first half year of life, does not commonly begin until the second half of the first year. It usually occurs in the blonde child who is of the pasty type of constitution. These children are usually overnourished and, even if not, appear so; although the body may be thin the face always seems full. The cause of pruriginous eczema is an allergy to some protein in the infant's diet or more rarely to something in its environment.

The location of the lesions in this type of eczema is usually in the center of the cheeks and on the extensor surfaces of the body. The lesions are composed of papules, which are isolated or confluent into groups or into a mass of infiltration due to closely packed individual papules. There is no crusting unless secondary infection (impetiginous eczema) occurs. In acute cases weeping may be present (weeping eczema). The papules, if scattered, may be hard and nodular, like small sago grains, or hard nodules with a red areola (strophulus), or if in a low grade chronic state are composed of small papules and scratch marks (prurigo). Itching is intense in contrast with the seborrheic form of eczema, which does not itch. The prognosis is not good as the duration is long and relapses occur frequently.

The treatment of pruriginous eczema is difficult and relapses occur frequently with a tendency to future chronic eczema and neurodermatitis.

In general an attempt must be made to find the offending protein, from the history of the case, by skin tests or by selective non-allergic diets. Where these procedures are not feasible, one may resort to the dehydration of the skin and produce good results, especially in the weeping and impetiginous cases. When this is combined with other local and general measures the course will be considerably shortened.

Dehydration is produced by restricting water and salt in the diet and this is accomplished by giving a concentrated diet low in milk which con-

tains 0.76 per cent salt. Desiccated thyroid, which lowers the water content of the tissues, may be used.

Skin tests have been popular since the work of Schloss in 1914 and Blackfan in 1916 but in my experience are disappointing. Theoretically the removal of the food which has been found positive by skin tests should produce a cure, but practically it does not work so well.

However, it is advisable to use these skin tests as a guide, if only one or a very few foods are found positive. If many foods are positive it is best to try other methods of treatment. One must always remember that eczema is only a "beauty fault" and will in time get well by auto-immunization. Therefore it seems wrong to undermine a child's health by drastic restriction of diet unless this seems imperative.

Of the three methods used in skin testing, the scratch, intracutaneous and patch methods, I prefer the first because of its simplicity.

In early infancy I seldom do skin tests but prefer dehydration and proper feeding. Specific foods recommended include devitalized milk such as Nestle's food, or non-allergic milk produced by S. M. A. Co., or artificial milk substitutes which contain no milk, such as Sobee or Cemac. These may help overcome the allergic disturbances.

Locally, crusts must be removed here also, first, because they are irritating; and second, to allow the remedy to come in contact with the skin surface to be treated. In the diffuse mild scattered type of this disturbance a lotion is preferable such as:

℞—Tuminol	1
Zinc Oxide	20
Talc	20
Glycerine	5
Aqua	100

In severe cases of pruriginous eczema, tar is almost of specific value both locally and constitutionally. At my last visit to the clinic of Professor Leiner, he claimed that when only a part of the lesions are treated by tar you will obtain improvement in the other lesions due to absorption of tar through the raw surface of the treated areas. Also, contrary to old teachings tar may be used both on acute and weeping surfaces. A good formula is:

℞—Crude Coal Tar	2
Zinc Oxide	2
Vaseline	30

In chronic and indurated areas use:

℞—Starch	20
Salicylic Acid	6
Sulphur	3
Crude Coal Tar	12
Lanolin	12
Saponis Viridis and Vaseline q. s. ad	60

For moist and weeping surfaces the daily application of 5 per cent silver nitrate or cold boric packs are useful in stopping the exudation. Areas where the ointment is rapidly wiped off by the child may be treated successfully by painting each day with full strength crude coal tar. Where itching and chronicity are observed, good results are obtained with x-ray treatment.

During the whole course of treatment of pruriginous eczema we must not forget the itching, since the scratching and itching make up a vicious circle, which keeps up the inflammation. Locally we use restraints such as cuffs, and constitutionally we diminish nerve irritability by bromides and phenobarbital. This itching is a neurosis of a conditional reflex nature and therefore persists long after the cause of itching has been removed, with the result that the temporarily cured eczema may flare up again from the trauma of scratching.

Relapses are common in pruriginous eczema. They are usually caused by irritants such as heat, wool and irritants either mechanical or chemical. Dentition, infection, overeating and gastrointestinal disturbances may also cause relapses.

There are a number of skin conditions in infants often described as distinct clinical entities, but which are merely different manifestations of eczema. They should be classified as eczemas because of certain basic characteristics.

I refer to: (1) erythrodermia desquamativa (Leiner); (2) seborrheic dermatitis; (3) neurodermatitis; (4) impetiginous eczema; (5) strophulus; (6) Ritter's disease (dermatitis exfoliativa neonatorum). Now a few words about each of these before closing.

Erythrodermia desquamativa (Leiner).—This was first described by Leiner in 1908. It is characterized by a diffuse inflammatory redness often covering the whole body, accompanied always by desquamation and usually by seborrheic manifestations. The scales may be so large that whole flakes of the horny layer of the skin are detached as in scarlet fever or they may be fine and branny. The skin is not dry but excessive

exudation is not present and there is no tendency to crust formation. This condition is usually found in previously well developed breast-fed children. Soon severe intestinal disturbances occur with frequent green stools and evidence of toxemia. The prognosis is not good, the mortality being often as high as 30 per cent. This condition is really a form of acute seborrheic eczema and should be treated along these lines. Locally the following should be applied three times a day:

℞—Zinc Oxide..... 30
Olive Oil.....100

If a proper dietetic routine is instituted as previously described under seborrheic eczema, that is, a combination of breast milk and butter-milk mixture or some other formula high in proten and salts, there will be a rapid diminution of the dyspeptic stools and a gradual disappearance of the constitutional symptoms.

Seborrheic dermatitis is often mentioned as a separate clinical entity but is also only one of the manifestations of seborrheic eczema. It resembles Erthrodermia Desquamativa except that the seborrheic manifestations are greater and the constitutional manifestations less. Greasy scales on the head are much more marked and eruption on the body tends to be more moist. The most important differential diagnostic point is that the eruption does not cover the whole body as in Leiner's disease, but stops at the waistline, leaving the trunk practically free, giving the so-called riding breeches type of distribution. Gastro-intestinal symptoms are also less pronounced. The prognosis is not so grave and the treatment of this is similar to that described in Leiner's disease.

Neurodermatitis is a condition found in older children usually from the age of two to five years. It is characterized by a thickening of the skin and a smooth reddish-gray lichen-like rash on the flexor surfaces of the knee and elbows, and also occasionally on the back of the neck. This is usually found in neuropathic children who have had eczema previously and is characterized by marked itching and repeated tendency to relapse. This is merely a type of pruriginous eczema wherein the condition has become a neurosis after the allergic phase has been passed. This disturbance should be treated as a neurosis. Dietetic changes are not necessary and are of no avail. The child's health should be built up and the patient should be removed from all irritating environmental influences. A vacation to the country will often work as a miracle. Locally, crude coal tar (full strength) or in ointment form, combined with x-ray will remove the itching and infiltration. Large doses of sedatives are of great benefit. At the recommendation of Professor Leiner we have used certain animal fats, as Cod Liver Oil, or vegetable fat, as corn oil, in these cases with apparent benefit.

Impetiginous eczema is a term used to describe an eczema which becomes infected. Here the infection seem to play the prominent rôle, so that the eczematous background is hardly manifest. It is more commonly found in cases of pruriginous eczema than in the seborrheic type, as the former usually tends to be more moist, and occurs in older children who have a greater opportunity for infection, and who, due to their itching, are more liable to cause infection by scratching. It is more important not to forget that scabies or pediculosis capitus may be a predisposing factor and must be properly treated.

In the treatment of impetiginous eczema proper, the crusts may be removed by cold boric acid packs in the daytime and a weak ammoniated mercury ointment at night. Usually at the end of two or three days the infection will have been eliminated and the eczema can be treated by the methods previously described for this type.

In stubborn persistent cases a marked change for the better can be procured by the dehydration diet previously described. Hydrochloric acid may be given, for acid tissues are less moist than alkaline. This causes a diminution of the oozing which has been the culture media for the bacteria.

Strophulus is a disturbance characterized by the appearance of papules either isolated or in groups, on the extensor surfaces and buttocks. At first these papules are surrounded by a red areola which soon disappears leaving behind large sago-like nodules. This is one of the forms of pruriginous eczema. In its treatment we must remember that it is an allergic condition often caused by milk. It is best treated by eliminating cow's milk from the diet, and temporarily putting the child on goat's milk, and when the lesions have disappeared, cautiously adding new

foods. Locally a lotion like calamine lotion is satisfactory.

Ritter's disease (Dermatitis Exfoliativa Neonatorum) is a condition the etiology of which has been repeatedly questioned. Various explanations of the cause of this condition have been made. Our impression is that it is a pemphigus neonatorum superimposed upon the child with a seborrheic form of exudative diathesis. Those cases which we have been able to follow eventually show manifestations of eczema. This disease usually begins similar to pemphigus. Later the lesions become larger and less defined, sometimes involving areas as large as the palm of the hand. Characteristic of this disturbance is a condition of epidermolysis, that is, the cutis is separated from the epidermis by an invisible serous exudate, so that if one rubs an apparently normal area of skin briskly with the tip of the finger the skin will peel off leaving a moist surface. Also typical of this condition is a tendency to marked infiltration around the mouth. Associated with this disease are marked constitutional disturbances, with fever and sometimes even convulsions.

The treatment of this condition is similar to that of pemphigus. Their etiology is similar, since they are primarily infectious. The tops of all lesions are removed carefully in order not to distribute the pus. The raw surfaces are touched with 5 per cent silver nitrate and then the following lotion is applied:

℞—Dermatol	10
Zinc Oxide	20
Talcum	20
Glycerine	5
Aqua	100

The child should have daily baths of tannic acid and be continually powdered (dry treatment). No salves are to be used. In addition to the tanic acid baths, the continual powdering and the drying lotions, we have the child lie in a hammock formed by pinning a sheet to the edge of both sides of the bed. The child lies without clothes on a bed of powder and is thus kept dry and continually rolling in powder. The bed clothes are kept from touching the skin by a cradle.

Since Ritter's disease is an infection in an exudative child, breast milk as an exclusive diet is not satisfactory. If the child has two or more of his feedings replaced by a formula high in protein and salts such as the buttermilk mixture, the high mortality, which has often been stated to be 50 per cent, will be much reduced, and the course and severity of the disease favorably modified.

Conclusions

1. Eczema, although a group name, is still a fairly distinct entity and should be retained, unless further specific information invalidates our present concept.

2. In infancy and early childhood one should not consider eczema merely as a skin disease, but as one of the manifestations of a constitutional condition called exudative diathesis that must be treated constitutionally as well as locally.

3. This condition covers two distinct types, etiologically and clinically different, and requiring different treatment. Often these types may be mixed.

4. Various other conditions previously described as separate diseases but which are merely types of exudative diathesis have been briefly considered.

CASE REPORTS

LITHOPEDION*

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A lithopedion or "stone child" is the result of the infiltration of the fetal structures with calcium salts in an ectopic pregnancy that has developed to the fourth, or, as a rule, to or beyond the seventh month.

An ectopic pregnancy usually occurs in the tube. Some authors believe that ovarian or abdominal pregnancies seldom if ever occur primarily and that they are the result of an expulsion of the fetus from the tube and attachment to the ovary or some abdominal tissue such as the broad ligament, from which the necessary blood supply is obtained.

Uterine lithopedions have been reported where the primary growth of the fetus was in the cornua with a gradual enlargement into that portion of the uterus. Küchenmeister[5] reports three such cases.

T. Cuizza[2] reports a rupture of one horn of a bicornate uterus and the formation of a lithopedion.

The following classification of lithopedion by Kuchenmeister[5] is generally accepted:

1. Lithokelyphos—only the membrane surrounding the fetus being calcified.
2. Lithokelyphodion—the fetus and membranes being calcified and adherent.
3. Lithopedion—the fetus alone being calcified. Here the membrane may be absent or closely adherent to the fetus.

Calcification is the final stage of an ectopic pregnancy unless decomposition, absorption, expulsion or surgical removal takes place. The fetus shrinks in size after death occurs, the fluid portions being absorbed.

Schumann[8] states that 3.3 per cent of normal embryos implanted in the tubes go on to full term, 1.05 per cent die, 2.2 per cent become monsters, and the remainder are absorbed. He collected records of fifty cases coming to full term and operated upon. Other authors report that a lithopedion develops in 1.5 to 1.8 per cent of extrauterine pregnancies.

A very small percentage of cases of lithopedion were diagnosed before operation prior to the beginning of the twentieth century. No doubt the percentage of lithopedions in ectopic pregnancy as given would be too high at the present time as a diagnosis of ectopic pregnancy is now usually made early and operation performed before the formation of a lithopedion is possible. A lithopedion will probably be a rarity in the future.

When an ectopic fetus reaches full term and no operation is performed the following may result: (1) Skeletonization with absorption of the soft parts; (2) replacement of the soft parts with fatty acids, soaps and stearic acids without suppuration; (3) suppuration with abscess formation and destruction of soft structures and discharge of pieces of bone through the vagina, rectum or occasionally the skin; (4) true lithopedion formation with infiltration of calcium salts.

In a case of lithopedion there is usually a history of pregnancy with atypical signs; later a mass may be found in a lateral position in the pelvis. As absorption of the fluids in and about the fetus occurs, the mass becomes smaller but more defined and intimately associated with the uterus and adnexa. Mild abdominal pains often occur with symptoms of pressure on the rectum or bladder. There may be nausea, vomiting, dysuria, or constipation. The general health may be affected, with anemia and loss of weight. Carcinoma may be suspected. From extreme pressure or ulceration the gastro-intestinal tract or bladder may become definitely involved. In some cases few or none of these symptoms are present until near or at full term, when labor pains may begin with no signs of delivery.

When a lithopedion is within the uterine cavity, infection with foul discharge and expulsion of the contents are likely to occur early.

Smith[9] reports a case of lithopedion being retained fifteen years and causing bowel obstruction.

The x-ray may positively identify the lithopedion because of its density.

Kroemer[4] in 1900 reported thirty definite cases. From the last of the sixteenth century to the present time there have been reported about two hundred cases of lithopedion, an average of less than one a year. An unreported case has been called to my attention in a personal communication from T. P. McNamara[6] of Dubuque, Iowa. This was a tubo-abdominal pregnancy which went to full term. The tube was connected directly with the sac, but final degeneration and low grade infection necessitated an operation.

D'Aunoy and King[3] reported eighty-six cases of *true lithopedion* up to 1922 and since that time eight cases have been reported. This case of mine herein reported makes a total of ninety-five cases.

Bacon[1] states that in a series of 7,311 necropsies two lithopedions were found and in another series of 610 necropsies nine were discovered.

Kuchenmeister[5] tabulated reports by various authors of forty-eight definite cases from the years 1582 to 1880. He states the first case was reported by Albosius. Of these, five were abdominal, seven tubal, nine ovarian, eight uterine, and the balance were not definitely described. The duration of the lithopedion ranged from six months to fifty-seven years, the average being eighteen years. Twenty-one had had previous pregnancies, one woman had had 12 previous children, but most of them had had either one or no children. Eleven had one, four had two children each afterwards, and the rest gave no record of subsequent chil-

*Read before the annual meeting of the Southern Minnesota Medical Association, New Ulm, Minnesota, September 25, 1933.

dren. The pains began between the seventh and ninth months in seven cases, and earlier than this in the rest. There was one case of twin lithopedions.

Palliez and Dernez[7] questions what becomes of the cord and placenta. In my case here reported the cord and placenta were recognized and were calcified.

Case Report

The patient, Mrs. J., aged sixty-two, is a widow living on a small truck farm. Her husband died of cancer two years ago, her father of old age and her mother is still living at the age of ninety.

The patient has had no diseases except measles as a child and influenza in 1931, and no operations. She has had a great deal of headache and backache either before or after her menses, which began at the age of thirteen. The periods were regular, lasting about three days and of normal flow. She was married at the age of twenty. A year later, that is forty-one years ago, she had the characteristic symptoms of a normal pregnancy and at no time during the nine months does she remember having had any acute pains in the abdomen. During this time she had had less headache and vomiting. She came to term at the expected date and had definite labor pains which lasted two days and then stopped altogether. She was told by the physicians in attendance that an operation would be necessary.

Various doctors were called in consultation and it seemed to be their united opinion that the fetus should be removed surgically. A month or two elapsed before the patient finally saw a "specialist" in the city. An operation was advised, but since she felt well and the size of her abdomen was decreasing she decided to ignore the advice of her doctors. Contrary to expectation, the patient began to feel better and the size of her abdomen gradually decreased. She was later advised by her doctor not to have children. She, however, remained in good health, had no complaints, and subsequently bore nine children. Eight are living and well, the oldest being thirty-nine years old and the youngest eighteen.

With all the pregnancies she had less headache and vomiting than at other times. She had no dystocia with the labors. She had a perineal and cervical tear with resulting leukorrhea, which responded to treatments. She had some dysmenorrhea, an occasional headache, some nausea and vomiting until the menopause at the age of fifty-two. Her periods were always regular and about of the normal amount. Since the menopause she has had some vomiting spells and headaches, but not as frequently as before.

The patient states that at various times she has been urged by doctors to have the tumor removed, but not until a prolapsed uterus became very annoying, could she be persuaded to have an operation. The tumor itself gave no symptoms. She has obtained some relief for the prolapse by wearing a disc pessary for the last six months.

Five years ago she began to have a bearing down sensation in the pelvis. She gradually developed a prolapse of the uterus with cystocele. The last two years the symptoms have increased, with some vaginal bleeding, and the tumor mass had become tender and somewhat annoying. She is troubled with more or less constipation for which she has taken a cathartic. She has been slightly nervous and has had attacks of nausea and vomiting. She has had some urinary frequency. The uterine prolapse became more pronounced and very troublesome so that she thought the advice of her physician, Dr. Hugh Arey, who went into her history thoroughly, made a tentative diagnosis of a lithopedion, inserted a pessary to relieve her of the symptoms associated with the prolapse, but advised an operation. She was relieved somewhat of the discomfort from the prolapse but her nausea and vomiting continued and she had increased tenderness in the region of the tumor. She reluctantly decided to see a surgon.

Upon physical examination the head and chest were found to be normal. She had some pain on pressure over the gallbladder area. Her abdomen was prominent. A large, slightly fixed, exceedingly hard, some-

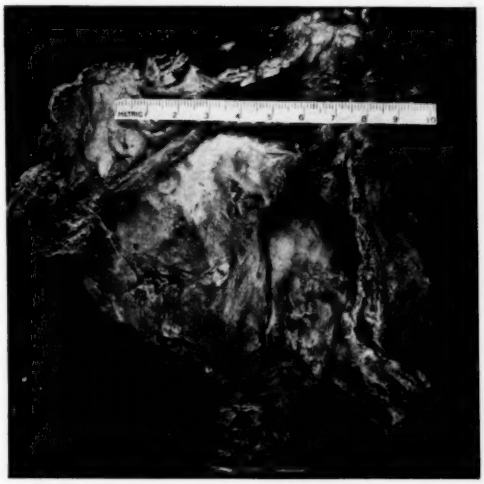

Fig. 1.

what tender nodular mass was easily palpable in the lower left abdomen. The mass extended up to the umbilicus. On pelvic examination a complete prolapse of the uterus with a pronounced cystocele and an incompetent perineum was found. Her temperature was normal, the pulse rapid but strong and regular. Her blood pressure was systolic 150; diastolic 80. Her leukocyte count was 6,000, hemoglobin 87, bleeding time three minutes and 40 seconds, and the clotting time five minutes. A trace of albumin was found in the urine. A clinical diagnosis was made of (1) lithopedion of forty years standing; or (2) dermoid cyst. The possibility also of a diseased gallbladder was considered.

An x-ray showed a large tumor mass approximately seven and one-half inches in diameter, the upper border reaching the umbilicus, the lower border low in the pelvis. The conclusion of the roentgenologist was either dermoid cyst or an ectopic pregnancy.

The patient was operated upon July 6, 1933. Ethylene and ether were used for anesthesia. Through a median incision a hard nodular tumor seven and one-half inches in diameter presented. The tumor was continuous with the distal three-quarters of the left tube. The tube had apparently dilated to accommodate the growth. Five inches of the upper and left portion of the tumor was attached to the omentum. Both ovaries and the remaining tube were normal. The uterus was normal in size, but the elongated ligaments allowed a complete prolapse. The other abdominal contents were normal except the gallbladder, which was enlarged and contained many medium sized and small stones. The tumor was easily lifted out of the abdomen and its attachments severed. The left tube was removed with the tumor. The uterine prolapse as well as the cystocele were then corrected by removing the central portion of the fundus of the uterus down to the internal os, and fixing the outer portions of the lateral uterine wall to the fascia of the recti in the lower angle of the abdominal wound. The abdomen was closed in the usual manner with supplementary dermal stay sutures.

The condition of the patient during the operation was good. The temperature the first and second day was 100 to 102 degrees and 99 on the third day. She had very little vomiting the first day, none thereafter, and some pain which was relieved by hypodermics of morphine gr. 1/6 and atropine gr. 1/150 occasionally during the first three days. A retention enema was given every four hours for two days. She had no distention. The intake and output soon became normal.

Fig. 2.

Nine days following the removal of the lithopedion a second operation was performed to remove the gallbladder and stones. Local, gas and ether anesthesia was used. A modified Bevan incision was made. The gallbladder was enlarged twice the normal size and contained numerous stones ranging in size from one to two centimeters in diameter, irregular and faceted. The gallbladder was irregular and surrounded with friable adhesions. It could not be brought into the wound opening. It was removed after ligating the cystic duct. The cystic artery was clamped with a forceps which was left in as a suture substitute on account of the friability of the tissue and the inaccessibility of the vessel. The abdomen was partially closed in the usual manner with four supplementary stay dermal sutures.

The patient's condition on leaving the operating room was good. She had very little nausea and vomiting after the first day. There was the usual slight rise of temperature and pulse for two or three days following the operation and she required a narcotic occasionally during the first four postoperative days. Her position was changed occasionally for several days. Three days after the operation the clamps were loosened and they were removed on the fifth day. The wound was in good condition and no bleeding occurred. Her recovery after the second operation was very satisfactory. She was in the hospital twenty-two days in all.

The tumor which was removed measured 22 x 16 x 16 cm. (Fig. 1). It was fairly recognizable grossly as a fetus. It was completely encapsulated in a fibrous and muscular sheath of from eight to ten millimeters in thickness. This membrane was adherent but not calcified. A section of the tube which remained attached to the tumor showed it to be a normal Fallopian tube, containing the lithopedion.

An x-ray (Fig. 2) of the tumor after removal, clearly showed the head of the fetus bent forward upon the thoracic cage, the spinal column, arms, and legs which are flexed and seen on either side of the forehead. The presence of the epiphyses as shown by the x-ray indicates a full term fetus that has calcium deposited in the soft structures and a lithopedion of the third classification of Kuchenmeister.

By means of a band saw the tumor was cut open approximately in the midline through the spine and sagital suture of the skull. The brain was a red brown homogeneous firm structure. The bones and dura were apparently normal. The umbilical cord was normal in appearance and inserted into a partially calcified but easily recognizable placenta.

The heart was beefy red and about the size of a large strawberry. The lungs were pigmented yellow and were soft and macerated. The diaphragm, pleura, and pericardium were normal. The contents of the abdomen were remarkably normal in appearance, save for their somewhat dehydrated condition. The coils of the intestine were normal. The stomach was flattened and filled with a yellow mucoid material. The liver was red and flattened to three millimeters in thickness. The other organs were not grossly recognizable.

The skin, muscles, and long bones were all normal in appearance. The sex of the forty-year old fetus could not be determined.

Microscopic examinations showed some hypertrophy of the muscle of the left tube which was much dilated to accommodate the fetus. The outer layer of the sac was a vascular dense network of connective tissue and muscle. The arteries showed considerable intimal arteriosclerosis.

Sections of the brain, lungs, liver, muscle, nerve, bone, placenta and cord were all recognizable microscopically. The brain was filled with long typical cholesterin needles. There was considerable hyalin degeneration in all the organs. Striated muscle, bone and cartilage were the best preserved tissues. The liver was scarcely recognizable microscopically. Its parenchyma had largely disappeared and there were numerous granules of greenish pigment present. These pigment granules were possibly remnants of bile in the liver.

On September 13, 1933, when I last saw the patient, she was in very good health. She weighed 130 pounds, had had no headaches, nausea, vomiting or constipation. There is no prolapse of the bladder and no rectocele. Her color and general appearance are that of a healthy person and she is able to do much of her work.

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MALARIA

CARL H. MATTSON, M.D.

Saint Paul

Malaria is usually considered to be a disease of tropical climates, the habitat of the Anopheles mosquito. Lately, however, there have been reports that the Anopheles is also found in Minnesota. The cases usually seen in our state are those of the chronic, relapsing

type, in people who have migrated here from the South, where they suffered their initial infection some years previously.

It may, therefore, be timely, during the summer season when people are making vacation trips to all parts of the country, to call attention to malaria as a possible cause of pyrexia, chills and sweating, where physical examination may at first be essentially negative, and the cause of the symptoms doubtful.

Case Report

This state of affairs occurred in a woman, aged thirty-six, the wife of a dentist. When she was seen the afternoon of August 23, 1933, she complained of having felt very weak for the preceding two days. The same morning she had felt very chilly and feverish; later she perspired profusely. She also had a severe bilateral temporal headache, and a burning sensation in her epigastrium. Physical examination was entirely negative except for a temperature of 100.4°. The spleen was not palpable. Further questioning revealed that she had returned August 9 from a vacation trip through the South and East and that she had noticed gradually increasing fatiguability since about the sixth of August. She remembered that while in Florida she had been bitten several times by mosquitoes. She said that the puncture sites were still a little tender on pressure, and that they itched occasionally.

A tentative diagnosis of acute malaria was made, and the patient sent to the hospital. About midnight she had a chill and a blood smear was made at that time. This beautifully showed enlarged red blood corpuscles containing merozoites, many of them in the process of rupturing the cell walls. Previous to the chill she had had two doses of quinine sulphate, 5 grains each, and the temperature rose to only 102°. The next morning the spleen was palpated three fingers below the costal margin. She was given neoarsphenamine, 0.45 gm., with the idea of aborting further chills, as suggested in Beckman's "Treatment." She was then placed on quinine sulphate, gr. 5, every two hours until tolerance was reached. She had no further chills, but each day had a slightly elevated temperature in the afternoon, less on each succeeding day. It remained normal after August 28 (fourth hospital day). Following the initial course of quinine, she was given a short rest period, then gr. 20 daily in divided doses for a week. Upon leaving the hospital on the seventh day, she was instructed to take gr. 10 daily for seven weeks. The spleen was not palpable on August 29.

The patient has had no recurrence of her symptoms to date and a blood smear made six months after discharge showed no evidence of plasmodii.

CARCINOMA OF THE LUNG (PRIMARY?) IN A CHILD OF SEVEN*

ARNO W. SOMMER, M.D.

Elmore, Minnesota

PRIMARY carcinoma of the lung, once considered a very rare disease, has lately been found to occur more frequently than was formerly supposed. Since the publication in 1912 of Adler's monograph on Primary Malignant Growths of the Lungs and Bronchi a comprehensive literature on the subject has appeared, all tending to show that this condition is not so infrequent and that its incidence is increasing.

*Read before the annual meeting of the Southern Minnesota Medical Association, New Ulm, Minnesota, September 25, 1933.

Simons,[4] in his study of the work of eleven authors in the U. S. and Canada, comprising a total of 22,754 necropsy reports and covering a period of thirty-one years, shows an average of primary carcinoma of the lung in .6 per cent of all autopsies and 6.57 per cent of all cancers. This compilation reveals a gradual increase in the mortality percentage of plmonary carcinoma from .5 per cent in 1910 to 1.55 per cent in 1930. These figures are similar to reports of its incidence in Germany. The age group from forty to fifty years shows the highest incidence, with several cases in the eighty to ninety year group. The youngest age we have been able to find of an authentic case is seventeen years.

Grossly, primary carcinomata of the lung occur as: (1) a single, small nodule producing slight or possibly no symptoms; (2) miliary carcinosis, which grossly resembles an early shower of miliary tubercles; (3) a nodular form involving as a rule only one portion of a lung, there being one or more nodules which are usually not confluent, the boundary line between tumor and lung tissue being sharply defined; (4) an infiltrating form, the most common, usually starting in the bronchial wall and infiltrating along the bronchial ramifications. Late in the process an entire lobe of lung may appear as a solid yellowish white substance encircling and obstructing a bronchus. Softening and cavitation may occur.

Histologically primary carcinomata of the lung are divided into adenocarcinoma, squamous cell, cylindrical cell, and encapsulated or medullary forms.

The case reported presents an unusual condition because of the age of the patient, the presence of all gross and microscopic signs of carcinoma and the added evidence of a cystic origin of this neoplasm.

Case Report

M. B., a girl seven years and one month of age when first seen complained of headache, vomiting and attacks of dyspnea. The family history was negative. She was normal at birth, was breast fed and had a normal infancy except for an otitis media when a year and a half old. She had chicken-pox at the age of two and influenza for a period of two weeks when three years of age, with fever, cough and nose bleed. Tonsillitis attacks occurred during the third and fourth years.

The patient was perfectly well until August 25, 1931. On that day she began to vomit, and had a moderate fever, general body aches and profuse perspiration. These symptoms continued for about five days. There was a slight cough, not productive; no pain except general body aches.

She attended school from August 31st until September 6th, although she complained of not feeling well. On September 6th she had a choking spell. The mother says that she acted as though something were shutting off her breath and she became quite blue. This dyspneic spell lasted about ten minutes. About this time (Sept. 6) she began to have a harsh unproductive cough coming in paroxysms two or three times a day and followed by spells of dyspnea lasting five to fifteen minutes. She was in bed most of the time for ten days although she ate her meals regularly. No sputum was raised with these coughing spells.

On September 20, after having been out of school for two weeks, she was well enough to go to church with the family and to attend school the next day, but was out on the 22nd because she "breathed hard and vom-

ited once or twice." On September 23 I was called because her vomiting and dyspnea continued.

The girl was healthy in appearance, well nourished, well developed and in no evident distress, but complained of headache. Her color was normal. Breathing was slightly labored.

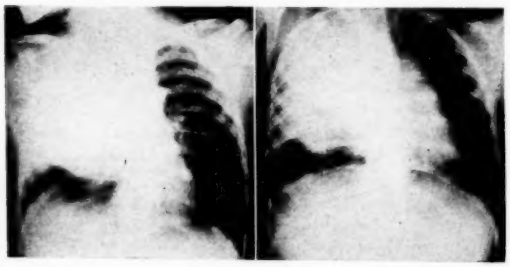

Fig. 1. Appearance before aspiration. *(Left)* Patient lying prone. *(Right)* Patient standing, showing well defined margins.

Examination was negative except for a slight fullness in the upper right chest with a diminished expansion in this area. There was a flatness on percussion over the upper right lung which extended down to the fourth rib anteriorly and the seventh dorsal spine posteriorly. Breath sounds were very distant and bronchial in character over this area. The rest of the lung area was normal except for a few crepitant râles heard in the lower right axilla. The heart apex was displaced slightly to the left.

A resolving pneumonia or a localized empyema were considered.

Following the first examination her condition changed very little except that the vomiting and headache ceased, but she had several spells of difficult breathing, coughed a little more and expectorated a small amount of white frothy sputum.

On October 6, she complained of pain in the right side of the chest for the first time and raised a little blood-tinged sputum. The temperature was 99.4°, pulse 80, respiration 26; w.b.c. 8,750; r.b.c. 4,100,000; hb. 78; Mantoux negative. There was some difficulty in breathing which seemed to be an inspiratory obstruction. X-rays showed a rounded opaque shadow occupying the upper two-thirds of the right side of the chest, and displacing the heart and the mediastinal structures to the left.

A paracentesis was performed the following day under local anesthesia, the fifth intercostal space in the right anterior axillary line being chosen. Some 240 c.c. of a markedly bloody fluid were obtained. More respiratory difficulty was experienced immediately after aspiration.

From October 7 to 12, there was no change in symptoms except more difficulty in breathing. On October 12, 270 c.c. of bloody fluid were aspirated with no change in physical findings. X-rays were taken after the aspiration. The patient gradually began to have more trouble in breathing and seemed to have an inspiratory obstruction. She became markedly cyanotic about the head and neck and died less than an hour after the second aspiration, after an illness of seven weeks.

Postmortem

Consent was finally obtained to make an examination limited to the thoracic organs.

Findings.—About 50 c.c. of free bloody fluid were found in right pleural cavity. The left lung and pleura were normal. A rounded, tense tumor mass in the right upper chest, 4 to 5 inches in diameter, smooth in contour, replaced the entire upper and middle lobe of the right lung, displacing the trachea and mediastinal vessels to the left. The mass was bluish-white in color and had a smooth, glistening capsule. Dense adhesions tied the upper portion of the tumor mass to the parietal pleura. The mass was not adherent to mediastinal structures. On incision of the capsule a small amount

Fig. 2. Appearance after aspiration.

of bloody serous fluid welled out. The mass consisted of a yellowish-white, marrow-like substance which was readily scooped out, leaving a capsule ¼ to ⅜ inch thick. The right lower lobe was normal as well as the heart and pericardium. Sections of the wall and contents of the mass, the right and left bronchi, right lower lobe of the lung, both lobes of left lung and liver were removed for microscopic study.

Microscopic report (Dr. E. T. Bell, Department of Pathology, University of Minnesota).—"The tumor in the lung is very sharply circumscribed and enclosed in a dense wall of fibrous tissue. No tumor tissue is found outside this fibrous wall. On microscopic examination the tumor is found to consist of a very cellular epithelial tissue which in nearly all situations is arranged into incompletely formed glands. The tumor is therefore recognizable histologically as an adenocarcinoma. In view of the fact that the tumor is enclosed in a dense fibrous wall the interpretation of it as a primary tumor of the lung seems reasonable. One would feel more sure of its being a primary lung tumor if the kidneys and ovaries had been examined at the postmortem, but it is difficult to understand how a metastatic tumor of the lung would be enclosed in a dense fibrous wall." He says, in another report, "My diagnosis would be a primary carcinoma of the lung developing in a congenital cyst. This is a most unusual tumor. I have been looking through the literature to some extent but have not found any cases of primary carcinoma at this age or of this type."

We cannot offer this case as an absolute, incontrovertible case of primary lung neoplasm in view of the fact that we were not permitted to do a complete autopsy. It is open to controversy as to whether or not this tumor really originated in the lung or was a secondary growth—a metastasis from the kidneys, ovaries, or thyroid, but I feel that the case is sufficiently unusual to warrant being recorded.

The microscopic evidence supporting the theory that this is a primary carcinoma developing in a congenital cyst brings up for consideration a clinical entity which has just recently come to be recognized. The first re-

corded American case of congenital cystic disease of the lung is Pappenheimer's,[3] recorded in 1912. Koontz[2] reported a case in 1925 and reviewed the literature on the subject, recording 108 cases, all European in origin. Since then Eloesser[1] has reported five cases from his own practice. Drs. Wood and Garvin,[5] of the Mayo Clinic, reported five cases of congenital cystic disease of the lung in March, 1933. Two of these cases were confirmed by bronchoscopic examination and lipiodol injections.

Congenital cysts of the lung occur in two forms: one the solitary cyst, and the other, cystic disease proper, with more or less diffuse cystic degeneration of the lung. The two forms may coexist.

A rather complete study of the literature reveals no recorded cases of carcinomatous degeneration of a congenital cyst, similar to the one here reported.

Fig. 3. Section of tumor and dense fibrous wall which completely surrounded tumor.

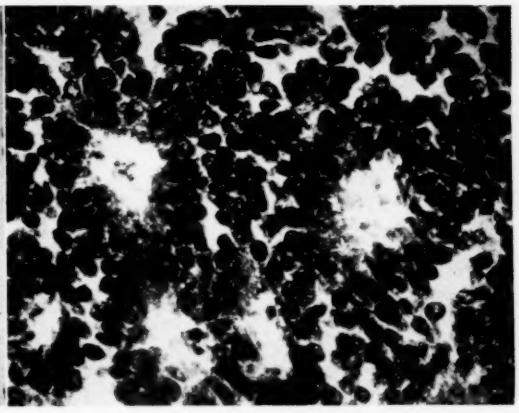

Fig. 4. Arrangement of cellular epithelial tissue in the form of glands is very evident.

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"YOU KNOW I HAVE TWO COWS!"

A professor of Economics at an Iowa college is a realist,—and a good teacher. So affirms A. L. Killian, of Cedar Rapids. In one of the professor's classes was a student who was head of the campus socialist activities and who never missed an opportunity to preach equality of income. In a recent examination one of the questions allowed him free play to expose his favorite doctrine. The professor, in announcing the result of the examination to the class, stated that he had decided upon a new system of grading. He had added up all the grades and found the average and was giving each student this average.

Whereupon the young disciple of Dr. John Dewey arose and expostulated with some heat.

"It is not fair," he said. "Here I have worked hard, have stayed home and studied when other members of the class went out to see the football team practice; have denied myself social parties—even the Prom—in order to keep my studies at top marks. It isn't right to give me the same grade that you give all the others."

The professor reached for the student's examination paper and replied:

"I got the idea from you," and read an excerpt. Whereupon the class guffawed loudly.

The professor said quietly that perhaps students had better be graded as they had been graded for hundreds of years, recognizing the various degrees of individual merit and application.—*Nation's Business*, June, 1934.

ALBERT ABRAMS REDIVIVUS

The Bureau of Investigation has reported on the Micro-Dynameter which is an exceedingly impudent attempt to exploit anew the so-called electronic reactions of Abrams. The idea of special vibrations for different diseases can be found among the concepts of ancient centuries. But the engineer who would revive the Abrams doctrine has introduced new wrinkles, which must be the product of a training in engineering. The Micro-Dynameter of Mr. Ellis has been exhibited at a meeting of the Inter-State Postgraduate Medical Assembly. A few of the physicians who derive their scientific pabulum through that organization have apparently invested in the device and thereafter been unable to find it of the scientific worthiness which at the time of investment it semd to possss. Moreover, a so-called medical periodical, *Clinical Medicine and Surgery,* has aided promotion of the device through its advertising columns; indeed, Mr. Ellis flaunts a letter from the editor of that publication, Dr. George B. Lake, in support of his contentions. It seemed when the late Abrams passed from our midst that his cult would pass soon from the scene. Little has been heard of Abramsism since that time, yet now like a spirit from beyond the sepulcher emerges the Micro-Dynameter of Mr. Ellis, and a medical organization and a medical periodical are available to help rap the tables and shake the tambourines to assist the materialization. (*Jour. A. M. A.,* January 6, 1934, p. 49.)

EDITORIAL

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BUSINESS MANAGER
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The State Meeting

A perusal of the program of the State Medical Association meeting to be held July 15 to 18 in Duluth indicates that this year's meeting promises to be second to none, as far as our annual meetings are concerned. We regret that space does not permit the publication of the extensive program.

Scientific demonstrations which have proved so instructive in connection with the American Medical Association meetings by enabling one specialist to see what is going on in other specialties are being utilized more and more in our state meetings. Time on the program has been set aside for these demonstrations.

Clinics have not been overlooked and the innovation of last year of having programs furnished by the various societies of specialists in the state will be continued this year. The bulk of the program will consist of general assemblies and sectional medical and surgical gatherings.

The commercial exhibits constitute an essential part of the convention and it is mutually important that they be visited, and, what is more to the point, patronized.

Our program committee has done an excellent piece of work . . . several distinguished guests will appear on the program . . . Duluth in July should be superb . . . most of us need to get away for a few days—a few good reasons for attending the Duluth meeting.

The Cleveland Meeting

From every angle the 1934 session of the American Medical Association was an unqualified success. Cleveland is an ideal convention city. The various local committees deserve much commendation for the delightful entertainment provided. The hotels, of which the city has many, did a great deal to add to the comfort and pleasure of their guests.

The exhibits, both scientific and commercial, were unusually varied, and displayed as they were in a capacious hall afforded excellent opportunity for inspection.

Cleveland itself is a city of beautiful proportions, its many handsome buildings combined in such a way as to produce a strikingly artistic whole.

The total registration was well over six thousand. The section meetings all held in one magnificent building, The Cleveland Public Auditorium, were well attended and many interesting subjects presented. The meetings of the House of Delegates under that "Admirable Crichton" Speaker of the House, Dr. F. C. Warnshuis, of Michigan, might well excite the envy of the most astute parliamentarian, and to Dr. Olin West, for his gracious, kindly consideration, one feels a debt of gratitude.

Among the outstanding problems considered, the House went on record as being unalterably opposed to any change affecting the present existing relationship between physician and patient.

The hospitalization and care of World War Veterans under the present system was regarded as inimical to the profession at large.

The advertising of medicinal preparations over the radio brought in a resolution of condemnation.

The subject of birth control was considered as a sociologic problem rather than medical.

The desirability of the use of drugs of the United States Pharmacopeia and the National Formulary was the subject of a resolution, and it was regarded of prime importance that all staff members of accredited hospitals be members of their local county and state societies.

A resolution was passed extending an invitation to The Canadian Medical Association to meet in joint session at Atlantic City in 1935.

The address of the president, Dr. Bierring, on "The Family Doctor and the Changing Order," which appears in the *Journal* for June 16, was well received. Containing as it does much food for thought it should be read and pondered upon by every physician who has the interest of the profession at heart.

The election of Dr. J. S. McLester of Birmingham, Alabama, as president-elect is a well deserved recognition of his many attainments.

J. T. C.

Preparation of Manuscripts

Most of the manuscripts submitted to MINNESOTA MEDICINE are well prepared and show evidence of care, not only in the use of English but in form as well. This statement applies particularly to articles submitted by authors whose writings frequently appear in print. A number of manuscripts, however, show evidence of carelessness in preparation or ignorance of the fundamental rules of composition, or both. These are the bane of the editor's existence.

A well written article reads so easily that few realize the amount of hard work it represents. The facile writer is rare. Even Osler, whose contributions were couched in such simple diction and were so clear in their meaning, spent much time and effort in going over his manuscripts, rewriting, transposing phrases and substituting words, before he was satisfied with the result. Medical men who consider themselves poor writers should derive considerable consolation from the contemplation of this fact.

"Brevity is the soul of wit." A prominent surgeon was once heard to remark at the conclusion of an address that anyone who spoke longer than twenty minutes was a darned fool and anyone who listened more than twenty minutes was a damned fool. How often the underlying truth of this statement is ignored. The same holds for written articles. One of the best articles ever written on appendicitis was one by Wilkie (Surg., Gynec. and Obst., July, 1927) which covered three scant pages. Brevity recommends a manuscript.

To take up more in detail the conventional requisites for a well prepared manuscript: The title should be carefully chosen so as to indicate specifically the subject matter. This is important when it comes to indexing.

The author's name is usually followed by M.D., indication of the possession of other degrees or titles being a matter of personal preference. There has been a distinct tendency of late towards the omission of such titles. University staff appointments frequently appear, following the author's name. Membership in a clinic or group, or other information regarding the author which may serve to place the author in the reader's mind, may well appear in a footnote, and this procedure might well be expanded.

The manuscript should be typewritten and double spaced for the convenience of printer and editor. To make corrections in a single spaced manuscript is well nigh impossible.

Most articles should end with a summary. Readers commonly refer first to the summary to determine whether the article promises to be of interest to them.

A correctly prepared bibliography is the exception, rather than the rule. For the sake of uniformity arbitrary abbreviations, capitalization and punctuation are used. While reference to published bibliographies is of value, a medical writer should possess one of the excellent manuals* on the subject of medical writing for this information. These annuals also contain many valuable suggestions. We have recently adopted the alphabetic listing of bibliographic references for the sake of convenience. Bibliographies are, as a rule, not published unless definite reference to the authors appears in the text. The reason is perhaps obvious.

Without going more into detail on the subject we hope that our remarks will result in more careful preparation of manuscripts in the interest of economy, and we sincerely hope that anything that has been said will not deter those who find it difficult to write from making the attempt, but that it will rather spur them on.

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MEDICAL ECONOMICS

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of the
Minnesota State Medical Association

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American Medicine Takes Its Stand

Ninety-eight thousand American physicians explicitly rejected socialization of medicine in America through their House of Delegates at the 85th Annual Meeting of the American Medical Association in Cleveland last month.

This tremendously important action came on the heels of a resolution favoring pre-payment health insurance, passed by the Regents of the College of Surgeons; upon an endorsement of the principle of health insurance by the House of Delegates of one of its state societies; and upon an energetic campaign on the part of the large Foundations that principally financed the Committee on Costs of Medical Care for social experimentation in medicine.

The College of Surgeons was sharply rebuked and a ten point platform was adopted. Against this platform, the experimenter in new forms of medical practice will henceforth be obliged to measure all his plans.

Thus did the American Medical Association clear the air for its component societies. Organized medicine will fight with renewed vigor for its traditional Articles of Faith: *that the physician is responsible to one person, alone, the patient, who freely selects and pays him; that no third person or agency must be allowed to step in between this patient and his physician.*

Following are the "ten points" themselves which form the social creed of the majority of physicians of the United States, but which have never before been so conveniently and so aptly expressed.

The Ten Points

1. All features of medical service in any method of medical practice should be under the control of the medical profession. No other body or individual is legally or educationally equipped to exercise such control.

2. No third party must be permitted to come between the patient and his physician in any medical relation. All responsibility for the character of medical service must be borne by the profession.

3. Patients must have absolute freedom to choose a legally qualified doctor of medicine who will serve them from among all those qualified to practice and who are willing to give services.

4. The method of giving the service must retain a permanent, confidential relation between the patient and a "family physician." This relation must be the fundamental and dominating feature of any system.

5. All medical phases of all institutions involved in the medical service should be under professional control, it being understood that hospital service and medical service should be considered separately. These institutions are but expansions of the equipment of the physician. He is the only one whom the laws of all nations recognize as competent to use them in the delivery of service. The medical profession alone can determine the adequacy and character of such institutions. Their value depends on their operation according to medical standards.

6. However the cost of medical service may be distributed, the immediate cost should be borne by the patient able to pay at the time the service is rendered.

7. Medical service must have no connection with any cash benefits.

8. Any form of medical service should include within its scope all qualified physicians of the locality covered by its operation who wish to give service under the conditions established.

9. Systems for the relief of low income classes should be limited strictly to those below the "comfort level" standard of incomes.

10. There should be no restrictions on treatment or prescribing not formulated and enforced by the organized medical profession.

In summary, the consensus was that the present standard of medical practice is superior to that afforded people generally in any other country in the world. If it is determined in any community that some experiment to change the method of administering medical service is desirable, observance of the principles adopted will remove many of the "disturbing influences" from such an experiment. In all such experiments attention must be sharply focused on the quality of medical service rather than primarily on any other factor.

Physicians and Relief

A critical situation will present itself for the consideration of the House of Delegates at the July meeting in Duluth.

Federal Emergency Medical Relief requires more attention to details of equitable operation (as it will doubtless be pointed out by responsible officials) than it is possible for those officials to give to it.

For physicians, more than service in a national emergency is at stake in this program, more than the justice or injustice of physicians' claims upon relief funds, or of restrictions imposed by local county administrators of those funds.

The fact is, as thoughtful men will readily agree, the entire complexion of medical practice in these United

States may well depend upon the successful operation of the current plans for medical care of depression victims.

If the present plan works smoothly, it will be a tribute to the wisdom, good faith and conscientiousness of the medical profession. It will also be a testimonial to the effectiveness and superiority of the private practice of medicine over State Medicine even in the care of public charges.

If it does not work smoothly, whether the fault is that of the profession or of state officials in charge of distribution of funds, the whole matter will be unkind. It will also serve as impetus to a proposal already broached in official quarters for county clinics for care of the indigent, and, eventually, for hired medicine in Minnesota and the United States.

Medical Field Worker

A proposal will undoubtedly be made in Duluth for the employment of a representative of the State Association to keep in constant touch with the offices of the State Emergency Relief Administration and with the details of each local situation throughout the state. Such a person could bring direct to the physicians in the state the significance of the ever-changing regulations and also present to headquarters the situation and point of view of medical men from first-hand knowledge.

Misunderstandings and misinterpretations are bound to occur, otherwise, on the part of all participants to such a scheme.

With the assistance of a medical field worker, however, these differences could be ironed out, local bitterness could be avoided and the whole machinery could be oiled for better and more efficient operation.

It is to be hoped that the delegates will give serious consideration to some such proposal.

Interesting Figures

Here are the figures on actual expenditures, to date, under the plan called "Medical Care in the Home."

The total amount paid out of relief funds in Minnesota for medical care, drugs and medicines and nursing, from July 1, 1933, when the plan was inaugurated, to March 1, 1934, is $42,441.77.

The bill for nursing (estimated as small) is not separated from those for medical care on the Relief Administration books. The bills for medicine and drugs have been separately recorded only since January, 1934. The figure from January, 1934, to March, 1934, was $12,091.71.

The total relief bill for the periods from July, 1933, to March, 1934, for all counties on relief was $3,178,553.67. Clearly, emergency medical care in all its phases cost the government only .01 per cent of that amount. These figures were supplied to state society officials by F. M. Rarig, Jr., executive secretary of the State Relief Administration.

In comparison with the total bill, the amount spent for medical care seems small. It is large enough, however, and significant enough in all its aspects to warrant care on the part of the profession to see that it is well and satisfactorily spent.

Not Reactionary

The action taken by the House of Delegates of the American Medical Association last week on the subject of the socialization of medicine was neither emotional nor reactionary.

It was done after mature deliberation and study of the experience of other countries where socialized medicine is now carried on. Every physician should carefully read and re-read the comprehensive survey made of this subject by the Bureau of Economics which appeared in the April *Bulletin of the American Medical Association.*

It is frequently stated that, unless the medical profession takes the initiative in instituting some form of socialized medicine, the people will force it on them. (Note the editorial reprinted below.)

The people will do no such thing if they study the data made available by the numerous surveys of the subject made by the American Medical Association. One wonders who is responsible for this persistent propaganda which arouses prejudice and also proposes illogical and impracticable systems of health control. It is high time that the impractical theories sponsored by ill-advised Foundations for social reform were crushed at the source.

Medics Raise Defenses

One outstanding feature of the American Medical Association convention at Cleveland was the adoption of a professional "ten commandments" designed to define the policy of the association in opposition to the health insurance system advocated by the American College of Surgeons. The Association resents the attitude of the College of Surgeons and charges it with presuming to legislate for the entire profession though not thoroughly representing it.

There is much to be said against state medicine as a general condition of practice. If the decision were vested in the majority of professional sentiment as expressed through the A. M. A. the issue would probably be dead right now but such is not the case for considerations involved deal with matters of professional business policy rather than of medical technic and professional ethics. For that reason a voice will be claimed for the laity interest.

As the situation develops, the ten commandments may not definitely avail since they apply within the profession and do not reach all the influences which will operate in arriving at a decision.—*Saint Paul Pioneer Press.*

The principles that dictated "The Ten Points" have been handed down from the ages. They have been tested by time and they have been found to be necessary to good medical care, the world around.

When occasion demands it, these principles can be and have been modified to meet local demands. The fact that, in all essentials, they have survived all of the social and economic revolutions of history, is formidable evidence of their worth.

In a country the size of the United States there are bound to be special conditions peculiar to certain areas that may well alter, to some degree, the details of medical practice.

Organized medicine is studying these local problems. It is formulating plans, making experiments. The Iowa Plan for Care of the Indigent is one; the Detroit plan for financing medical care for low income groups is another; the Michigan plan is another.

The fact is, that few professional groups are as thoroughly awake to the problems and needs of the times as the medical profession. Few of them are brought as close to the needs and aspirations of men.

Health Insurance

Michigan Physicians Make Plans

The Michigan State Medical Society will shortly vote on a plan for health insurance for the lower income group of the state of Michigan.

This plan has been evolved at the direction of the Michigan House of Delegates by a special committee and at great expense. (One periodical estimates the cost, to date, at $15,000.)

Dr. Henry A. Luce, Speaker of the House, and Dr. Nathan Sinai, D.P.H., who conducted several investigations for the Committee on Costs of Medical Care, went to England to make a first-hand study on the subject in January.

As a result of that trip and the report made to the House of Delegates in April, the principle of health insurance was approved, provided it is under the control of the medical profession.

Instruction is "Go Ahead"

The special committee was instructed to go ahead with plans for an experiment to be known as the Mutual Health Service plan, designed to provide adequate medical care to residents of the state within the less-than-$1,500-a-year income class and above the indigent class. The vote on this instruction was 61 to 9.

Result: Michigan becomes the first state unit of Organized Medicine to experiment with social medicine in America.

The plan as evolved today has not yet been approved by the House of Delegates, to be sure. It awaits final action at the September meeting and that action may be influenced considerably by the attitude of the House of Delegates of the American Medical Association at its June session in Cleveland. Nevertheless, the entire proposal, whether accepted or not, will undoubtedly assume a special significance in the eyes of all organizations interested in medical practice in the United States.

Specifically, the Michigan committee was instructed: first, to discuss the general idea of the plan with employers and employees; second, to determine such legal action as might be necessary for a mutual health service; third, to prepare a detailed plan for final action in September.

Thus far, according to report, the plan involves payment into a central treasury of a stipulated sum for each person assured of medical service. And medical service in each case is to include the services of a general practitioner, a specialist, dentist, nurse, hospital and druggist.

Costs

The cost for each person is tentatively figured at $27.88 per person for each year. The committee estimates, further, that the average family consists of four and a fraction persons. It has therefore set $118 as a tentative annual fee for which each family, regardless of whether it has two or a dozen members, may subscribe to the service.

Three cardinal points are stressed in the program.

1. Free choice of physician by the subscribing family.

2. Absolute control of the program by the medical profession (appropriate administrative machinery is sketched in the plan).

3. Exclusion of any effort to exploit health insurance commercially.

The committee and the society hope to avoid the evils and weaknesses apparent in European health insurance projects. They disapprove, for example, of the combination of the dole (unemployment insurance) and health insurance as found in England.

If a working plan is finally approved by the delegates it will be tried out, according to report, in some as yet undetermined county unit before it is undertaken as a state-wide project.

Detroit Objects

In spite of the overwhelming vote of the Michigan House of Delegates, all county units of the society do not appear to be in sympathy with the proposed experiment. Vigorous dissent is indicated in the following editorial quotation from a recent number of the *Detroit Medical News*, bulletin of the Wayne County Medical Society. Says this editorial:

"The sociologists state it is inconceivable that any form of health insurance can exist without unemployment insurance. The writer must agree that to try to do this spells evasion, cowardice or stupidity. This is our major objection to the plan proposed at the state meeting. Any honest approach to a disorganized, disjointed, creaking social system will not . . . put into effect a plan that seeks to bolster up economic inequalities. . . .

"For a glance at the cost of State Medicine and its satellites, let's look to Britain, a land with one-third the population and one-half the wage standard of America. Neville Chamberlain, Chancellor of the Exchequer, estimates the yearly expenditure of the British Isles, ending March, 1935, for protection, health and dole as follows:

Army	31,418,000 pounds	($161,000,000)
Navy	47,208,000 pounds	($244,000,000)
Health and Labor	147,526,000 pounds	($763,000,000)

"Health and Unemployment insurance cost $520,000,000 more than the cost of building and maintaining the world's biggest navy!

"Let's have the sociologists (well paid by Foundations) sell health insurance and its expensive companion, unemployment insurance, to the thoughtless people (including the doctors) who will hereafter and eternally fight the exorbitant taxes necessary to maintain these bureaucracies in political-spoils America (is Britain as full of political pork as America?) until the load becomes unbearable . . ."

"Verily, after Health Insurance will come the Deluge!"

The "Copeland Bill"

From the Congressional Record-Senate, Wednesday, May 16, 1934:

Mr. Copeland (Senior Senator from New York): Mr. President, I judge from the interest taken in the vote (on whether or no the Senators would take time for a consideration of S. 2800, once known as the "Tugwell Bill") that the bill is understood by the Senate . . . or at least the Senators think they understand it. As a matter of fact, propaganda put out against the food and drug bill are propaganda founded upon opposition to the first bill known as S. 1944. The bill which we have before us is the third revision of the bill. The bill which is now pending has almost no relationship to the bill which met with such violent opposition throughout the country.

I beg the Senators to believe me when I say this. In the interest of the public welfare and of the public health, before they determine to cast their votes against the passage of the measure, I ask that each Senator shall take the pains to ascertain for himself exactly what is contained in the bill. I am frank to say there has been manifested here today a degree of opposition which indicates difficulty in passing the bill at this late date in the session.

Mr. Lewis (J. Hamilton Lewis, Senator from Illinois): Mr. President, may I ask the Senator if the bill contains provisions that would justify its being known as the "Tugwell bill" against which we have received so many telegrams and letters?

Mr. Copeland: The bill to which I referred, known as Senate bill 1944, which has been revised three or four times since its introduction, is known to the public as the "Tugwell bill."

Mr. Lewis: But not the present bill?

Mr. Copeland: It is not the Tugwell bill that is now before the Senate. I have had the ambition, indeed, that it might be sometime called the Copeland bill.

Mr. Lewis: If it is a good bill, it should be known as the Copeland bill. If it is a bad bill, of course, it may be called the "Tugwell bill." (Laughter.)

Mr. Copeland: As a matter of fact, the first bill was prepared by various authorities and experts and the permanent employees of the Department; and the Tugwell bill, bad as its reputation is, in my opinion, does not deserve the bad name it has. However, that bill is not under consideration.

Mr. President, I am anxious on behalf of the committee to perfect the bill, so that, even though we may not come to the point of passing it, the bill may be in such form that *some future, and perhaps wiser, Congress may see fit to enact it.* . . .

* * *

This then is the status at a late date in the session of the "Tugwell-Copeland Bill."

It is obvious that the powerful propaganda against the bill goes on unabated in Washington and the likelihood of bringing the measure to a vote seems remote.

In the meantime, the out-dated Federal Food and Drugs act of 1906 must stand as best it may between the public and the gigantic food and cosmetic and patent remedy industries. It is obvious that these industries find aid and comfort in things as they are.

Ramsey County Plan

Medical Society to Take Lead in Summer Round-Up

A committee of the Ramsey County Medical Society appointed by its president recently met with a committee of the Saint Paul Council of Parents and Teachers to discuss the Summer Round-Up in Ramsey County.

The committee of physicians included Drs. J. C. Hultkrans, J. N. Dunn, and A. C. Schulze. The Parent Teachers Association committee was composed of Mrs. S. E. Linsley, Mrs. E. L. Baker and Mrs. H. C. James.

They reported as follows:

"The Ramsey County Medical Society was wholeheartedly in favor of the examination of the pre-school child. This movement by the Parent-Teacher Association to secure a physical examination and the correction of physical defects of all children before entering the school for the first time is of far-reaching importance, not merely for the welfare of these children but also as an educational procedure.

We felt that the method by which the examinations had been done in the past was incomplete, that it was impossible to examine adequately these children in groups. We advocated that these examinations should be done by the family doctor in his office. The educational feature of this movement was also emphasized and, as part of its objective, was included the education of the parents to the value and importance of periodic examinations of apparently healthy children. We assured the Parent-Teacher Association of our wholehearted support in the Summer Round-Up if it were conducted in this manner and that the family doctor would be willing to examine in his office, as he has in the past, any deserving child. After considerable discussion, the Committee of the Parent-Teacher Association agreed to eliminate any examinations en masse.

Doctors To Talk

"The following is the plan suggested: That the Parent-Teacher Association hold evening meetings at the various schools in March to which the fathers and mothers of the pre-school child be invited; that the programs at these meetings be directed primarily towards the education of the parents to the value of an adequate examination of the pre-school child; the speakers on this program to be a person from the Parent-Teacher Association, who is to give a little of the history of the Summer Round-Up as a major activity of the National Organization of the Parent-Teacher Association, and the purpose which they hope to accomplish; a member from the school to show the benefits and value to the child derived in the past even from incomplete examinations; and a member from the society to talk on some selected topic to show the benefits derived by an apparently well child from such examinations thoroughly done. Outlines should be prepared by the committee from the medical society so that the talks would be uniform and cover the main points. It was suggested also that it might be advisable to have a mother whose child had benefited to appear on the program as a sort of testimonial. The regular charts would be distributed at this meeting, and the number of families in each district divided among the workers, so that, for example, one worker would be responsible for and see that ten children had the examination and the correction of the remediable

physical defects found in such examination before the fall term started.

"This committee of the Ramsey County Medical Society recommends the adoption of this plan as agreed to by all members of these combined committees. It recommends that we attempt to give publicity to this plan through the press."

Official action will be taken soon by the Parent-Teacher Association.

Examining Westchester Children

An interesting Summer Round-up plan is in operation this summer in New Rochelle, Westchester County, New York.

The Westchester County Medical Society and the county's Parent-Teacher Association are jointly backing it.

"The idea behind this particular movement," says a recent editorial in the *New York State Medical Journal*, "is that it shall not be just another child health effort, but shall be the start of a continuous, life-long health program, to be carried on as completely as possible under the guidance of the family physician acting as health counsellor.

"It is, to begin with, a health examination of all children between the ages of two and five. But here again we have a new feature, because they are to be divided into three classes. First, all the mothers who can afford to do so are to be urged to take the children to their family physicians for examination in their private offices. Next, for those who cannot afford this, special pay clinics will be provided at a fee of $2.00, conducted in their own offices by physicians especially selected by the local medical society. Finally, children of the indigent will be examined at the free clinics of the Baby Welfare stations, largely by the same doctors who conduct the pay clinics. All these classes of examinations will be thorough and painstaking but the first will include procedures that cannot be given in a free or a $2.00 examination. All examinations will include a tuberculin test, if the parent consents, a feature suggested by the Westchester Tuberculosis and Public Health Association.

Family Lesson

"If this plan is successful in New Rochelle, it will be recommended for adoption in the rest of the county. It may well be watched by other counties, too.

"The pre-school examination idea has become very popular throughout the country. Parent-Teacher associations are strongly in favor of it. Too often, however, children have simply been rounded up en masse and examined wholesale at special free clinics. As a result, examinations have been sketchy and parents have been habituated to the idea that medical care is free. The Westchester plan is more far-seeing. It starts the little feet on the pathway to a longer and stronger life and teaches the whole family that real health service is worth saving for and paying for and is worth all it costs in the end. *It is a lesson the whole country needs to learn.*"

Call the Police

An unusual number of drug addicts are reported to be hounding doctors' offices these days. When the physician attempts to take a history or make an examination they disappear or try to make trouble.

Just why there should be more of these callers than usual is not entirely clear. But attention of all physicians should be called to the danger. They will assist the authorities and protect themselves if they will call the police immediately.

Minnesota State Board of Medical Examiners

Spring Valley Woman Continued on Probation

State of Minnesota vs. Elizabeth Schulz

Mrs. Elizabeth Schulz, farm woman, Spring Valley, Minnesota, appeared before the Honorable Norman E. Peterson, Judge of the District Court at Preston, Minnesota, on June 4, 1934. Mrs. Schulz had been ordered by the Court on May 9, 1934, to appear before the Court at Preston.

Judge Peterson granted a motion by Mr. David A. McVeety, County Attorney of Fillmore County, to dismiss the second charge of practicing healing without a Basic Science certificate, against Mrs. Schulz. The Court was informed by Mr. McVeety that the defendant was no longer engaged in the practice of healing. Judge Peterson questioned Mrs. Schulz directly as to whether or not she was practicing healing, and the defendant informed the Court that at no time since her arrest on January 11, 1934, had she treated any one. Judge Peterson, however, continued Mrs. Schulz on probation until the November, 1934, term of Court at Preston, Mrs. Schulz having pleaded guilty on May 9, 1934, to a charge of practicing healing without a Basic Science certificate following the death of Russell Prinsen, who had been under Mrs. Schulz' treatment for diabetes. Mrs. Schulz is under a suspended sentence of three months in the Freeborn County Jail, at the present time. One of the conditions of her probation is that she is not to practice healing in any form.

List of Physicians Licensed by the Minnesota State Board of Medical Examiners May 8, 1934

(April Examination)

By Examination

Bair, Hugo Linden, Harvard, M.D., 1929, Rochester, Minn.

Baker, Thos. Williams, U. of Pa., M.D., 1931, Rochester, Minn.

Brink, Norvel Otto, U. of Minn., M.B., 1933, St. Paul, Minn.

Buchstein, Harold Ferdinand, U. of Minn., M.B., 1933; M.D., 1934, Minneapolis, Minn.

Buchtel, Henry Augustus, Harvard, M.D., 1931, Rochester, Minn.

Davis, Raymond Darius, U. of Minn., M.B., 1933, Duluth, Minn.

Deissler, Karl Joseph, U. of Heidelberg, Dr. Med., 1931, Rochester, Minn.

Donovan, Daniel Leo, U. of Minn., M.B., 1933, St. Paul, Minn.

Erich, John Bernhardt, U. of Illinois, M.D., 1932, Rochester, Minn.

Fait, Roman Vincent, U. of Minn., M.B., 1933, Minneapolis, Minn.

Fatherree, Thos. Jefferson, Jr., Tulane, M.D., 1932, Rochester, Minn.

Gillespie, Delmar Robert, U. of Minn., M.B., 1933, St. Paul, Minn.

Gillespie, Donald Leo, U. of Minn., M.B., 1933, St. Paul, Minn.

Gordon, Philip E., U. of Minn., M.B., 1932; M.D., 1933, Minneapolis, Minn.

Hauser, George Wesley, Ohio State Univ., M.D., 1932, Minneapolis, Minn.

Hedemark, Homer Harold, St. Louis University, M.D., 1933, St. Paul, Minn.

Johnson, Douglas Leonard, U. of Minn., M.B., 1933, St. Paul, Minn.

Kerlan, Irvin, U. of Minn., M.B., 1933, Minneapolis, Minn.

Kostick, William Robert, U. of Minn., M.B., 1933, Minneapolis, Minn.

Lieberman, Nolton Senard, U. of Minn., M.B., 1932, St. Paul, Minn.

Malvey, Kenneth P., U. of Minn., M.B., 1932; M.D., 1933, Moorhead, Minn.

McKechnie, Robert Edward, McGill, M.D., 1931, Rochester, Minn.

Mead, Newton Cromwell, Northwestern, M.B., 1932; M.D., 1933, Coleraine, Minn.

Mills, John Harold, U. of Chicago, M.D., 1933, Rochester, Minn.

Mulrooney, Raymond Edward, U. of Minn., M.B., 1933, St. Paul, Minn.

Nettrour, Walter Scott, U. of Pittsburgh, M.D., 1931, Rochester, Minn.

Noble, John Lawrence, U. of Minn., M.B., 1933, St. Paul, Minn.

O'Brien, Veronica, U. of Minn., M.B., 1933, Minneapolis, Minn.

Odel, Howard Miller, Northwestern, M.B., 1932; M.D., 1933, Rochester, Minn.

Olson, Kenneth Lloyd, U. of Minn., M.B., 1932; M.D., 1933, Minneapolis, Minn.

Pass, Isadore J., U. of Minn., M.B., 1932; M.D., 1932, Minneapolis, Minn.

Robinson, Van Cooper, Northwestern, M.B., 1932; M.D., 1933, Rochester, Minn.

Rossen, Ralph, U. of Minn., M.B., 1933, Minneapolis, Minn.

Shima, Raymond Thomas, U. of Minn., M.B., 1932; M.D., 1933, New Richmond, Wis.

Vickoren, Angvald, U. of Minn., M.B., 1933, Duluth, Minn.

Thysell, Vernon Duane, U. of Minn., M.B., 1933, Minneapolis, Minn.

Waldren, George Richard, Northwestern, M.D., 1927, Pembina, N. D.

Watson, Wm. John, U. of Minn., M.B., 1933, St. Paul, Minn.

Wulff, Marjorie, U. of Minn., M.B., 1933; M.D., 1933, St. Paul, Minn.

By Reciprocity

Foley, Maurice P., U. of Pa., M.D., 1931, Rochester, Minn.

Havel, Harold William, Creighton, M.D., 1933, Omaha, Nebr.

Petersen, Peter Carl, Univ. of Nebraska, M.D., 1932, Ogilvie, Minn.

National Board

Hays, Albert Theodore, U. of Minn., M.B., 1932; M.D., 1933, Norwood, Minn.

President's Letter

Our Annual Meeting

EACH year our annual meeting has grown in distinction and worth to its membership. The program of our 81st meeting, at Duluth, July 15 to 18, is about to be distributed to our members.

The Committee on Scientific Assembly began its task last fall and has worked faithfully to make this program at once practical and of exceptional scientific interest. The local Duluth committees have been on their toes, and have expended more time, thought and energy on this meeting than ever before in our history. They are determined to make it a success, and to create the feeling, "Let's go back again to Duluth."

The modern tendency of this type of post-graduate instruction is toward small group meetings to replace a portion of the traditional large general sessions. For the third year, emphasis will be placed upon small group instruction available in the exhibits and scientific demonstrations at this meeting. In spite of what appeared, at first, to be serious restrictions as to space, these demonstrations will be more numerous and more varied than ever before. They cover an interesting range and variety of subjects, all of them of practical interest to the general practitioner. They range in subject from carbon monoxide poisoning and dangerous cosmetics to fish tapeworm disease and injection treatment for hernia. For a complete list, you are earnestly recommended to study your program.

The Monday program will see a repetition of the successful special society meetings inaugurated for the first time at the Rochester meeting; also, there will be two mornings of dry clinics conducted by distinguished Minnesota men and out-of-state guests; a symposium on the latest developments in endocrinology; a novelty in the shape of a Medical Question Court, new to these meetings, at which a group of experts will be open to quizzing; a scientific cinema and two important evening meetings, one the banquet.

This meeting has more than a scientific importance, however, to organized medicine in Minnesota. These are days when our organization, our traditions and our professional standards are under fire as never before. At these meetings our social and economic policies are defined, and our organization cemented.

The profession and the public good need your personal interest in problems of medicine today.

President,
Minnesota State Medical Association.

OBITUARY

Dr. Hugh Custer Arey

1878-1934

Dr. Hugh C. Arey, a practitioner for more than twenty-eight years at Excelsior, Minnesota, passed away May 20, 1934, at his home.

A graduate of the University of Minnesota, Dr. Arey was a member of the Hennepin County Medical Society, Minnesota State Medical Association, American Medical Association, and was very active as a member of the Boy Scouts Council of the Minneapolis area, having special supervision of health and safety at the summer camps. In 1932 he was given the Silver Beaver award for distinguished service to boyhood by the Minneapolis Boy Scouts Council. Dr. Arey had also been very active in community relief work at Excelsior.

Dr. Arey is survived by his widow, three sons, Dr. Stuart Arey, James B. Arey and Hugh Custer Arey, Jr., and a daughter, Mrs. Edward M. Thompson, all of Minneapolis.

Dr. Harold Samuel Boquist

1888-1934

Dr. Harold S. Boquist was born in Red Wing, Minnesota, October 21, 1888. Graduating from the University of Minnesota in 1921, he had practiced in Minneapolis since that time, at one time being a resident physician at the Glen Lake Sanatorium. He was a member of the staffs of Asbury, Fairview and St. Andrews hospitals, with offices in the Medical Arts Building. He was also an instructor in the University of Minnesota Medical School and a member of the Hennepin County Medical Society, Minnesota State Medical Association, American Medical Association, the Hennepin County Tuberculosis Association and the Trudeau Society.

Following a two months' illness Dr. Boquist died June 12, 1934, at the University Hospital at the age of forty-five. He is survived by his widow; three sons, Howard, Harold and Lowell, and a daughter, Alice. He was a brother of Dr. E. T. Boquist.

Dr. Muret Leland

1874-1934

Dr. Muret N. Leland, Minneapolis, died May 28, 1934, at his home at the age of sixty.

Born at Wells, Minnesota, Dr. Leland obtained his degree from the College of Physicians and Surgeons in Chicago. After serving his internship at St. Elizabeth's Hospital, Chicago, Dr. Leland began practice in Wells, Minnesota. After ten years in this location he went to Minneapolis, where he practiced for a period of thirty years. He was a staff member of the Deaconess Hospital.

Dr. Leland was a member of Phi Rho Sigma medical fraternity, a Mason, and a member of the Hennepin County Medical Society, Minnesota State and American Medical Associations.

He is survived by his wife; a daughter, Elizabeth, and a sister, Mrs. Dan F. Bull, all of Minneapolis.

OF GENERAL INTEREST

Dr. J. W. Byram has moved from Echo, Minnesota, to Young America, Minnesota, where he is now established for the practice of medicine.

The award granted by the Southern Minnesota Medical Association to a senior in the Medical School, University of Minnesota, on the basis of character, scholarship and extra-curricular activities was presented this year to Meredith Guernsey. The recipient served his internship at the Minneapolis General Hospital and received his M.D. degree in June.

Dr. Robert B. J. Schoch was recently appointed Health Officer of Saint Paul under the new political régime.

Dr. Schoch received his degree from the medical school of Northwestern University, Chicago, in 1908, and after serving his interneship at Grant Hospital, Chicago, began the practice of medicine in Saint Paul in 1909.

Except for a period of service in the army during the World War, Dr. Schoch has practiced continuously in Saint Paul. Enlisting as a first lieutenant in the medical corps, he was sent to Camp Green, Charlotte, N. C., and later spent some nine months over-seas with the 55th Engineers. While abroad he received his captaincy.

The appointment of Dr. Schoch to this responsible position has met with the general approval of his medical confrères.

Duluth Offers Relief To Hay Fever Patients

Those in charge of arrangements for the state meeting at Duluth in July have thought it advisable to call the attention of visiting physicians to the beneficial climate and topography of Duluth and vicinity for hay fever sufferers.

Situated as it is, immediately fronting Lake Superior, for a distance of seventeen miles, Duluth offers a haven for the average hay fever victim. It is bordered by rugged country abounding in evergreens and birch forests, and many lakes and streams, instead of cultivated fields with their associated weed disturbances. The Lake is the deepest inland body of water on the continent, is fed by springs, and has a maximum temperature change of only six degrees. The 32,000 square mile surface area of the lake acts as a natural air conditioner by removing dust and pollens from the air above it. Weather bureau statistics show that the prevailing wind direction is off the lake, and that temperatures exceeding 90 degrees occur on an average of one day a season.

Restless patients should find ample amusements in Duluth. Boat companies offer many cruises; trout fishing is good in small streams and in Lake Superior itself; the scenic North Shore Highway offers a delightful route for automobile rides of a hundred miles or more; golf courses, both public and private, are plentiful and in good condition.

Housing facilities are adequate. There are several fine hotels, some directly on the lake front; small cottages may be rented at Park Point, the natural barrier between Lake Superior and the harbor. More detailed information may be obtained for patients by inquiry to the Public Health Committee, Duluth Chamber of Commerce, or to the Hay Fever Club of America, Hotel Spalding, Duluth.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MEDICAL BROADCAST FOR THE MONTH

The Minnesota State Medical Association
Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 11:00 o'clock every Wednesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month of July will be as follows:

July 4—(Holiday)
July 11—The Modern Hospital
July 18—Gastro-intestinal Upsets
July 25—Diabetes, Heart Disease and Cancer

AMERICAN COLLEGE OF PHYSICIANS

The American College of Physicians will hold its nineteenth Annual Clinical Session in Philadelphia, April 29-May 3, 1935.

Announcement of these dates is made particularly with a view not only of apprising physicians generally of the meeting, but also to prevent conflicting dates with other societies that are now arranging their 1935 meetings.

Dr. Jonathan C. Meakins, of Montreal, Que., is President of the American College of Physicians, and will arrange the Program of General Sessions. Dr. Alfred Stengel, Vice President in Charge of Medical Affairs of the University of Pennsylvania, has been appointed General Chairman of local arrangements, and will be in charge of the Program of Clinics. Mr. E. R. Loveland, Executive Secretary, 133-135 S. 36th Street, Philadelphia, Pa., is in charge of general and business arrangements, and may be addressed concerning any feature of the forthcoming session.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

At the annual meeting of the Minnesota Academy of Ophthalmology and Otolaryngology the following officers were elected for the ensuing year: Dr. James S. Reynolds, president; Dr. Henry Grant, first vice president; Dr. Frank Knapp, second vice president; and Dr. Walter E. Camp, secretary-treasurer. The newly elected members of the Council are: Dr. Kenneth Phelps, chairman; Dr. George McGeary; and Dr. Erling W. Hansen.

PROCEEDINGS *of the* MINNESOTA ACADEMY OF MEDICINE

Meeting of April 11, 1934

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, April 11, 1934. Dinner was served at 7 o'clock and the meeting was called to order at 8 o'clock by the president, Dr. A. E. Wilcox.

There were fifty-five members and one guest present.

The scientific meeting was as follows:

IMPORTANCE OF NON-PAINFUL FEATURES

S. Marx White, M.D.
Minneapolis

ABSTRACT

Because the pain commonly occurring with a sudden occlusion of a coronary vessel, or its branches, is similar to that felt with the angina pectoris of effort, clinical differentiation has lagged far behind the pathologic knowledge of these two conditions. The publications of Herrick in 1912, 1918 and 1919 aroused widespread interest in this country, and many others have added to the facts by which now a relatively definite differentiation can be made in the great majority of instances of either condition. There is much definite evidence to support the contention that when heart pain is prolonged beyond the briefest time following the cessation of effort causing it, there has been at that time a definite closure at some point in the coronary arterial system. Such a sudden closure may succeed weeks or years of angina of effort, or much more rarely may be succeeded by a series of such paroxysms.

Infarction with necrosis of a considerable portion of the heart wall is the result to be expected from such a sudden closure of a nutrient vessel. Since there is a wide variation in the degree to which collateral circulation is possible in the coronary arterial systems of different individuals, the size of the infarcted area is not dependent alone on the site of the closure.

With the necrosis of muscle certain features besides the pain are prone to occur and should be given the most careful study during the early hours, days and weeks following the painful seizure. In this way only can the concrete evidences of actual infarction be brought to life. Leukocytosis, if searched for, will usually be found early, has been recorded within two and three hours, may be demonstrated for one to two weeks in some instances, is most often at 15,000 to 20,000, but may reach 30,000. Fever is commonly present but rectal temperatures are necessary to demonstrate it, as a rule, since there may be accompanying shock-like conditions which lower mouth temperatures. If the area of infarction is large enough to reach the epicardium over the ventral surface of the heart, a pericardial friction rub may be heard. The friction sounds may be very evanescent and are heard in only about 15 per cent of the cases. Frequent and careful auscultation is necessary to demonstrate it, as a rule. The pericarditis is part of the reaction of the living tissues against the neighboring necrotic areas, is not septic, and is practically never accompanied by massive effusion in the pericardial sac.

When the necrosis reaches the endocardial lining intra-cardiac thrombi usually form at the site. This process is manifested to the clinician only when embolism occurs in the arteries of either or both the pulmonary or peripheral circulation. Careful and repeated study for signs of embolism should be made. In the arteries of the legs and arms, particularly, records should be made on first examination of the case as to the presence and character of pulsation in all the peripheral vessels observable by the examiner. The clinical symptoms of embolism in the extremities may be minimal, but the disappearance of pulsation in a vessel known to have been previously pulsating, when taken in conjunction with the symptoms, may give conclusive evidence of embolism and thus by inference may lead to the recognition of the intra-cardiac thrombosis.

Lowering of blood pressure is a common accompani-

ment of infarction of the heart wall. This lowering may be extreme, and may be of decided prognostic significance.

Changes in the electrocardiogram have received much attention in the literature and may be of great importance in locating the lesion. They may help to determine whether the infarction involves the anterior or posterior walls of the heart or the septum. Changes in the electrocardiogram are absent in about 20 per cent of the cases when the conventional arm and leg leads alone are used. Anterior-posterior chest leads bring to light changes in the muscle not otherwise shown.

Studies for the signs of infarction are of great importance, since a patient with an infarcted area in the heart wall requires prolonged rest in order to assure the maximum integrity possible for that heart if survival occurs. If study has shown a considerable area of infarction to be present, experience has taught me to require a minimum rest period of eight weeks, this period to be prolonged if excessive or progressive damage seems probable, as shown by events during the recovery period. The occurrence of aneurysm of the heart wall, and of crippling sequelæ, should be diminished by a properly protracted rest period.

Practically all the disurbances of rate and rhythm to which the heart is subject, have been seen accompanying coronary thrombosis. They may be of great importance in the management of the case. Their management will be given more extended consideration in another communication.

DISCUSSION

Dr. Moses Barron (Minneapolis): This is a very interesting presentation of the events, symptoms and findings following coronary occlusion. Dr. White mentioned the many different signs and symptoms which we must consider in making a diagnosis. To illustrate the difficulties he pointed out a case where the patient presented all the findings of coronary thrombosis which later proved to be one of gallbladder disease. The more frequent error in diagnosis is in diagnosing gallbladder disease when coronary thrombosis is present, often to the great discomfiture of the surgeon who contemplates operation.

I would like to add one word in regard to the management of these cases with reference to prolonged periods of rest. We know that it is all very well to have a patient confined to bed for many months whenever there is an uncertainty as to how much damage exertion may produce. In our usual experience, however, we encounter patients who cannot afford to take such long periods of rest. We find that in the average case the patient may be allowed to sit up a little after three weeks of absolute and complete rest in bed. The sitting up must be very gradually increased by only a few minutes each day. Then the patient is allowed gradually to take a few steps so that in about another month he will be allowed to start doing a little work. In most cases the results of such management are almost as good as if they are kept in bed for four or five months. In fact, it is often surprising to find in young people, after letting them up and increasing their exertion slightly, how they come back to an almost normal condition.

I recall two cases of coronary thrombosis, one of three years', another of four years' standing, where the patients are now doing absolutely everything as if nothing had happened to their hearts. Examination at the present time reveals no evidence of previous myocardial injury. Though we must be careful not to put them to work too early, I think that after about three weeks of complete rest we can get good recovery in cases where there is going to be any recovery at all.

Dr. J. S. Gilfillan (St. Paul): Dr. White has made such a complete exposition of this subject there is very little more to be said about it. In coronary thrombosis the pain does not have to be a terrible pain. It may be that a man goes to work in the morning and comes into the office about 5 o'clock in the afternoon saying that he has worked all day but he doesn't feel well. He may be found to have a coronary thrombosis. The point should be remembered and if you suspect a coronary thrombosis get the man hurriedly to some place where you can make the preliminary examinations and know what you are doing; get him to a hospital where you can make a leukocyte count, examine the peripheral arteries, possibly have a cardiogram; in other words, have some definite place to start from and then decide where to go. Then after four or five days have another cardiogram, and if you see it change right under your eyes, you can be sure that something is going on in that heart.

I do not believe in a prolonged period of rest. If the heart appears to be doing its work in six weeks, let the patient up. Usually one decides to keep the patient in bed six weeks and then begins to compromise with him. If the patient has been in bed for six weeks and during that time has shown no evidence of heart failure you can let him up gradually and let him get to work. The prognosis is not so bad, if they get through the first few hours. Of course the shock may be so great that the heart just quits. If the patient does not get up later on he may develop a weakened myocardium in the way of a congestive heart failure. But usually if they get through their attack and through a period of rest in bed, it is not often that the heart goes bad. In fact, I have seen people who were better afterward, for the blood pressure usually keeps down for a long time after. I think probably an estimate of six weeks' rest would be safe. In my observation I believe the greatest danger is another attack. I do not think the danger of muscular failure of the heart is very great.

Dr. H. T. Nippert (St. Paul): I have had some experience in my own family. Dr. Louis had attacks for fifteen years and he died of an accident. At postmortem there was entire occlusion of the right coronary artery. I think the mistake we make is to put our patients to bed too long. If a man has coronary disease in a mild degree let him enjoy life as much as possible, take life as it is, and don't make a cardiopath out of him. Treat these patients psychologically, treat them as human beings, and not too scientifically.

Dr. Moses Barron (Minneapolis): I would like to say just one other word in regard to exercise. These patients should be kept absolutely at rest in bed for three weeks, then there should be another four weeks of a gradual progressive getting them up out of bed. To me this is one of the most important factors in the treatment; that is, that the getting up must be very gradual, at first sitting up only a few minues and increasing by only a few minutes each day. Getting them up suddenly may do a great deal of damage.

Dr. T. A. Peppard (Minneapolis): Dr. White has given us a very beautiful story of this very dramatic happening. He has traced the history of our information concerning it from the time when the diagnosis was considered impossible, to the time when a diagnosis of coronary occlusion is easily and accurately made. It has gotten to be not only the property of the medical profession but also the property of the laity and the legal profession. In fact, one of my patients quickly made his own diagnosis, which I, and the autopsy later, confirmed. One of the non-painful features is that of oliguria, or even anuria, which has led to the erroneous impression that there was some renal insufficiency. In considering coronary disease we need to differentiate clearly between coronary insufficiency and coronary occlusion. In regard to the matter of rest, I find that I am keeping my patients quiet a little longer than I did five or ten years ago. However, I do believe that a six weeks period of bed rest is entirely adequate. A considerable number of these patients are returned to a fair dgree of activity.

Dr. A. T. Mann (Minneapolis): I hesitate to say anything on this subject because this is such a complicated question and I do not know a great deal about

it. There is the nervous element and regeneration of the blood supply to consider. But I am wondering whether the internist can not learn something from the surgeon in regard to the strength of the wall they will get and whether or not the wall would be strong enough to let the patient up in three weeks or six weeks. We have had a great deal of experience with regeneration of tissue and have worked it out very carefully in connection with hernia operations. As I understand the facts, the regeneration of connective tissue, its circulation, its cellular elements and fibrous elements change so that the strong fibrous elements increase to make scar tissue quite firm at the end of two months. We have an understanding that a scar is nearly as strong at the end of two months and practically as strong at the end of three months as it ever will be. Of course, as a matter of fact, a scar goes on becoming stronger for ten years, but it is nearly as strong at two months and practically as strong at three months as it ever will be.

In the Army a great many hernia operations were done and the patients put back to work. When they were put back at the end of six weeks many of them recurred, and when put back at the end of two months many of them did not recur. Would that throw any light on this time element in bed in heart cases?

R. T. LaVake, M.D.,
Secretary.

Meeting of May 9, 1934

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, May 9, 1934. The president, Dr. A. E. Wilcox, presided.

There were fifty-two members and one visitor present.

THE DOCTOR IN FICTION

Harold E. Hullsiek
Saint Paul

Dr. Hullsiek took for his subject the character and adventures of Roderick Random in the novel of that name by Tobias Smollett.

PULMONARY CARCINOMA

F. F. Callahan, M.D.
Pokegama

Dr. Callahan read a paper with the above title and reported cases. Lantern slides were shown. (To be published separately.)

DISCUSSION

Dr. E. K. Geer (St. Paul): It seems to me this paper of Dr. Callahan is very timely because it is unquestionably true that the incidence of primary bronchial carcinoma is on the increase and it is a question that challenges our diagnostic ability as well as our therapeutic ingenuity. The point regarding diagnosis I have particularly in mind is that in atypical pulmonary lesions if we will resort more frequently to bronchoscopy our diagnoses of this condition will be more frequent. Our treatment has been most unsatisfactory. We may prolong life for a year or two, or sometimes five, with x-ray or radium, but as surgeons become more skillful and experienced in chest surgery, they may and should have more to offer.

I think Dr. Callahan is to be congratulated on picking up these cases in a hospital that is devoted almost exclusively to tuberculosis. His horizon is not limited entirely by the tubercle bacillus.

R. T. LaVake, M.D.,
Secretary.

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

ANNUAL SYMPOSIUM on CANCER

Devoted to the Occurrence of Cancer in Private Practice in Minneapolis and the Available Means of Treatment

MEETING OF APRIL 5, 1934

The President, Dr. Kenneth Bulkley, in the Chair

Dr. Kenneth Bulkley: It is a pleasure to welcome you all here tonight. Inasmuch as our program is a rather long one, I shall be very brief.

First, for the benefit of our guests, may I announce that the Minneapolis Surgical Society meets on the first Thursday of each month during the winter in the Lounge of this same floor and that each and all of you are at all times welcome. Our meetings are in no sense closed. They start promptly at 8:00 p. m. and terminate at 10:00. Our programs appear on the bulletin boards of various hospitals and can be regularly obtained from the secretary at cost.

Tonight, as you know, our subject is Cancer—the term being used in its broader sense. It is a most important subject for consideration by all branches of the medical profession, for there can be but little question but that, per hundred thousand population, deaths from cancer are constantly increasing.

We have in this Society two standing committees—one on fractures and one on cancer. Each of these committees is obligated yearly to prepare for us one meeting. Tonight it is the Cancer Committee's turn. Their problem has been a difficult one and in working it out they have done conscientiously a hard and excellent piece of work. The committee chairman is Dr. J. Frank Corbett, to whom I now turn over the remainder of the meeting and whom I now, with the greatest of pleasure, present to you. Dr. Corbett.

Dr. J. Frank Corbett: At the request of Dr. Kenneth Bulkley, I was honored with the chairmanship of the Cancer Committee and the following men, representing all of the designated hospitals, accepted membership in the committee:

J. F. Corbett, *Chairman*
F. A. Olson, *Secretary*

Ivar Sivertsen	Fairview
R. C. Webb	Asbury
W. C. Peterson	Swedish
L. H. Fowler	At Large
Martin Nordland	Northwestern
A. A. Zierold	General
S. H. Baxter	Hillcrest
A. E. Johnson (by invitation)	Swedish
J. M. Hayes	St. Mary's
J. A. Johnson	Eitel
O. J. Campbell	Abbott
Daniel MacDonald	Deaconess
Kenneth Bulkley	Northwestern
Verne S. Cabot	St. Barnabas
Wm. T. Peyton	University

COMPARATIVE RESULTS BEFORE 1922 (LOW VOLTAGE) AND AFTER 1922 (HIGH VOLTAGE AND "SATURATION" TECHNIC)

	1902 to 1922 Low Voltage—Variable Technic		1922 to 1928 High Voltage and "Saturation"	
	3 Yrs. Per Cent	5 Yrs. Per Cent	3 Yrs. Per Cent	5 Yrs. Per Cent
Pre-operative and postoperative—all classes	55	47	69	55
Postoperative and with no axillary glands	96	84	96	94
Postoperative with axillary glands	63	55	70	73
Postoperative—all classes	59	49	80	77
Recurrence and metastatic—all classes	39	19	34	24
Primary inoperable—all classes	42	30	42	30
Primary operable—clinically positive	87	87	93	69
Average results in all cases treated	48	33	56	40

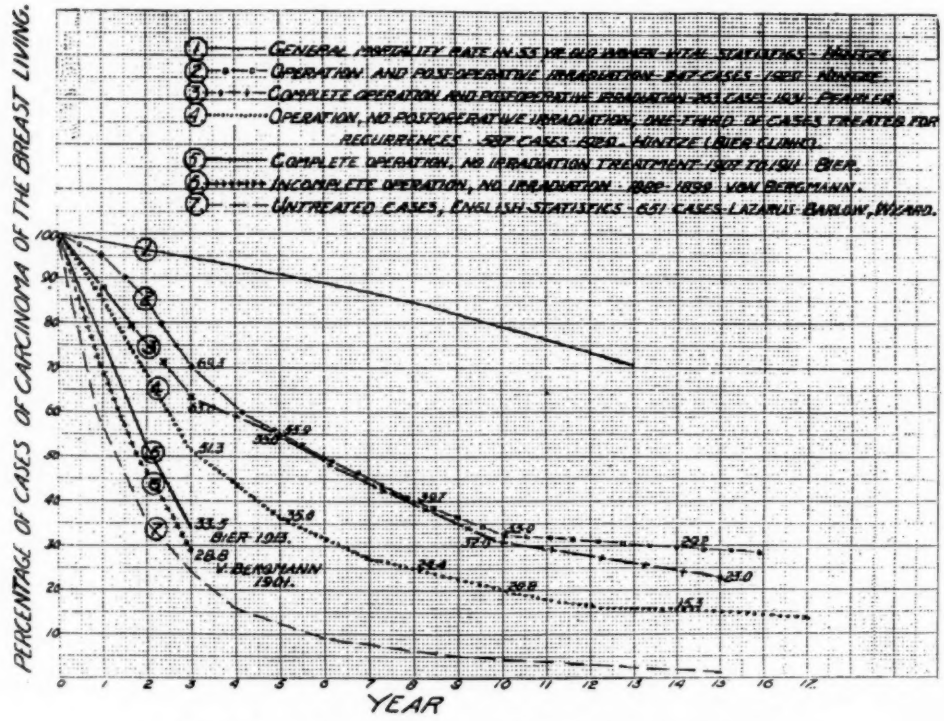
PERCENTAGE OF CASES OF CARCINOMA OF THE BREAST LIVING.
YEAR
1 GENERAL MORTALITY RATE IN 55 YR OLD WOMEN AFTER STATISTICS - NORTH
2 OPERATION AND POSTOPERATIVE IRRADIATION - 849 CASES - 1920 - MINOT
3 COMPLETE OPERATION AND POSTOPERATIVE IRRADIATION 253 CASES - 1914 - PFAHLER
4 OPERATION, NO POSTOPERATIVE IRRADIATION, ONE-THIRD OF CASES TREATED FOR RECURRENCES 582 CASES 1920 - MINOT (MEG CLINIC)
5 COMPLETE OPERATION, NO IRRADIATION TREATMENT 1907 TO 911 BIER.
6 INCOMPLETE OPERATION, NO IRRADIATION 1902-1909 VON BERGMANN.
7 UNTREATED CASES, ENGLISH STATISTICS - 651 CASES - LAZARUS BARLOW, WIZARD.
69.1
51.3
33.5
BIER 1913.
28.8
V. BERGMANN 1901.
55.9
35.0
39.7
35.0
28.4
43.0
32.0
28.8
22.2
23.0
15.3

Chart 1. Value of irradiation in carcinoma of the breast. (After Pfahler.)

By invitation, the following men have served:

Frank J. Anderson	R. G. Allison
G. T. Nordin	W. H. Ude
C. R. Drake	R. H. Morse
A. S. Fleming	C. D. Harrington

Three sub-committees, including all members of the committee but with individual chairmen, were organized.

Dr. Ivar Sivertsen, as chairman of the first sub-committee, had direction of the survey of the incidence of cancer.

Dr. Martin Nordland, as chairman of the second sub-committee, made a survey of the radium facilities at our disposal.

Dr. A. A. Zierold, as chairman of the third sub-committee, made a survey of the x-ray facilities.

Altogether, seven meetings were held and reports and advice were received from Drs. Allison, Morse, Nordin and Ude from the standpoint of the x-ray, and Drs. Drake, Fleming and Peyton from the standpoint of radium therapy. Everyone on the committee made his contribution and accepted the task imposed upon him.

As a whole, the committee has made a study of the cancer problem in Minneapolis as to the number of deaths reported annually from cancer in Hennepin County, the number and type of cancer cases treated in the private and charity hospitals in Minneapolis and the available x-ray and radium equipment for the treatment of cancer in Minneapolis. The recent report of the American Society for the Control of Cancer indicates satisfactory x-ray and radium equipment at the Cancer Institute at the University. The Cancer Committee has, therefore, devoted its time to a study of the cancer situation and its relation particularly to the private hospitals in Minneapolis.

I also am indebted to Dr. G. E. Pfahler, who furnished me with reprints of one of his articles, "Results of Radiation Therapy in 1,022 Private Cases of Carcinoma of Breast from 1902 to 1928." This deals largely

with results of x-ray therapy, and the work is old enough to permit of reduction to statistics. He considers experience with combined radium and x-ray too limited and too recent to be considered in detail. He states: "It seems to me that good results are practically doubled if a patient received thorough and skillful postoperative treatment." With his permission, I present one of his charts which substantiates this statement in regard to breast cancer.

The committee feels that it has made a beginning, but that there remain many problems. The greatest of these is a uniform way of reporting all cases and an adequate follow-up system. This may be provided for by the further work of this or some other similar committee. However, the first task was that of inventory and the present report is limited to that. I will now call upon Dr. Ivar Sivertsen for the survey of cancer cases occuring in private practice.

SURVEY OF INCIDENCE OF CANCER—MINNEAPOLIS HOSPITALS 1933

DR. SIVERTSEN: It is generally agreed that cancer is still on the increase, notwithstanding the educational efforts being made to inform the public concerning its ravages. By looking over the records of the local health office covering the period from 1920 to 1932, inclusive, we find a definite increase in cancer deaths as follows:

Year	Deaths
1920	445
1925	550
1930	739
1932	729

Whereas in the case of tuberculosis, one finds a definite decrease as follows:

Year	Deaths
1920	352
1925	214
1930	143
1932	105

The value of education seems to have been demonstrated in the case of tuberculosis.

In the year 1932, 5,176 deaths were recorded in Minneapolis among a population of 489,400. Cancer accounts for 14.5 per cent of the deaths.

In the year 1920, 4,714 deaths were recorded in Minneapolis among a population of 380,582. Cancer accounts for 445 or 9.4 per cent.

Dr. F. G. Gade of Oslo, Norway, gives some interesting statistics in a little book on cancerous diseases. He attempts to answer the question—Is Cancer on the Increase? He shows that, according to the figures of John K. Gore, comparing the periods 1901 to 1905 with 1921 to 1925, there is a definite increase in cancer death rate in all countries except one (France showed a decrease of 27.7 per cent). Time does not permit the mention of all,—it will suffice to note that Austria showed an increase of 68 per cent; England and Wales an increase of 47.1 per cent; and the United States an increase of 30.9 per cent.

These figures are comparable with those disclosed by our local health office. There is a definite increase in the cancer death rate. I, for one, do not believe that this increase is altogether due to improved diagnoses or increased longevity. There are other factors which we, as yet, do not understand.

In an effort to determine the number of cancer cases treated by the hosiptals in the city during 1933, reports from the hospitals were tabulated and examined. Although this may not be an exact picture, it should indicate the trend of affairs. We find that 999 cases were reported as treated in the various hospitals of the city. This figure includes 172 from the Minneapolis General and 114 cases from Hennepin County treated at the Minnesota General Hospital. In other words, 703 cases were treated during 1933 at the private hospitals, or approximately 70 per cent of the total.

This study has as its object not only to help the physician in his care of these cases but also to inform the public that the medical profession of our city is able and willing to care for cancer cases and is interested in their care.

This report would become much too lengthy if I should go into any great detail. A few figures might be of interest. Of the total 729 deaths in 1932, we find 51 per cent were males, 49 per cent females. These figures conform with most records consulted by the writer. As to age incidence, two deaths occurred in the first year of life; four between two and five; three between five and nine; and one between ten and fourteen. The oldest ages recorded were ninety to ninety-four years. The greatest number of deaths (337 deaths) were recorded in the sixty to seventy-five year period. The records do not disclose whether sarcoma or carcinoma caused death in the early years of life.

Deaths according to organs involved showed: Breast, 184; stomach, 110; intestine, colon, sigmoid, rectum and anus, 134; prostate and bladder, 112; cervix, 97; body of uterus, 35. Possibly the greatest surprise came when we noted that cancer of the pancreas caused twenty-five deaths.

All portions of the body were represented and it is of interest to note there were twenty-five deaths from cancer of the larynx, pleura and bronchi. This would seem to show an increase in the types of cancer.

It is likewise interesting to note that in considering the age incidence in relation to sex, we found the greatest number of deaths among females in the 60 to 64 age group, while in males it appeared in the 70 to 74 age group, or ten years later. This bears out the statement by Dr. Dahlstrom and the writer that muscular activity has a bearing on the incidence of cancer.

How soon after discovery of tumor or suspicious symptoms did they seek medical advice? In looking over the hospital reports for 1933, one finds the first consultation after the appearance of the first symptoms ranged from one month to twenty years, many being several years. One male patient, aged sixty-three, a bladder case, stated he had had symptoms for forty years. We found several with bladder and prostatic disease who had been troubled for several years prior to seeking medical advice. In stomach cases, the elapsed time ranged from a few weeks to two years. In breast cases it was noted that consultation was often immediately after discovery of the lump and ranged from one day to several weeks. Again, a few waited months. It would seem that the prostatic patient is prone to wait longer than the others before consulting his physician. It seems that publicity would be of value in shortening the period in this type of disease. One hospital reported:

Stomach, 5 weeks to 3 years (most 2 to 5 months); sigmoid, 5 days to 4 months (most 5 days to 5 weeks); uterus, 2 weeks to 2 years (most 6 months); breast, 3 days to 1 year (most 2 to 6 months); cervix, 3 weeks to 3 years (most 3 to 9 months).

In general, it may be stated that the average patient does not seek advice until the symptoms are so pronounced that "He who runs may read."

In the January issue of the *Hennepin County Medical Society Bulletin*, in a notice designated "Truths for the Public," by Dr. W. A. O'Brien, relative to the value of forming public opinion, it was stated that 6 per cent of cancer cases in Minnesota were treated at the Minnesota General Hospital, and 8 per cent at the Mayo Clinic, leaving 86 per cent treated by private physicians and smaller groups. If this is true there is plenty of work for all of us to do.

CONCLUSIONS

1. From a superficial survey of the Minneapolis Hospitals' experience for 1933, approximately 1,000 cases of cancer are treated annually, private physicians handling about 70 per cent of these cases.

2. The Committee on the Study of Cancer from the Minneapolis Surgical Society feels that a certain amount of information should be given the public at large relative to cancer and cancer treatment; that the various recognized hospitals of the city are well prepared and willing to assist in the treatment of cancer by means of surgery, x-ray and radium.

3. A study of the statistics from the Minneapolis Health Department discloses a definite increase in the number of deaths from cancer over various yearly periods.

The Minneapolis Surgical Society is definitely interested in supporting and encouraging any movement which would inform, advise and encourage cancer patients to seek medical and surgical advice at the earliest possible moment; in this way to obtain the greatest hope for a cure, and thereby decrease the incidence, morbidity and mortality from cancer.

Finally, the Committee extends its appreciation to the various hospitals and staffs for their coöperation and courtesy in forwarding the reports for this study, and to Dr. F. E. Harrington and his staff at the Health Department for their coöperation and assistance.

SUMMARY OF MINNEAPOLIS HOSPITAL CANCER EXPERIENCE, 1933

Carcinoma—General carcinomatosis	19
Breast	184
Bronchi, lungs, larynx, pleura	25
Face	80
Gall-bladder—bile ducts	22
Liver	25
Stomach	110
Intestine	8
Colon	33
Sigmoid, rectum, anus	93
Pancreas	25
Esophagus	14
Pharynx	2
Tongue and mouth	22
Jaw	9
Glands	12
Bones	10
Spine	12
Brain	7
Ovary	26
Cervix	97
Uterus	36
Vagina and external genitals	8
Pelvis	1
Prostate	71
Testes and external genitals	13
Kidney	12
Bladder	41
Skin	24
Undetermined	4
Sarcomata	12
Thyroid	1

DR. J. FRANK CORBETT: In the treatment of cancer in the private hospitals by the members of this Society, it is not intended to present for discussion the treatment of the various types of cancer as it occurs in the operating room, but it is our purpose to survey the various types of accessory equipment indicated and required for the proper treatment of cancer in this community. With that purpose in view I will next call upon Dr. Arthur Zierold, Chairman of Sub-Committee on X-ray Therapy.

REPORT ON X-RAY THERAPY AS AN ADJUNCT TO SURGERY

DR. A. A. ZIEROLD: Cancer, for a great many years, has been known and recognized and for a great many years surgeons have treated it. It is probable that they will continue to do so for many years to come, as the problem of treatment is primarily a surgical one. It must be remembered that whenever cancer, in its primary form, can be totally excised, it can be cured and that the result obtained is more often determined by the state of the patient when first seen than by the nature of the operation. It is only when cancer is neglected and so widespread as to demand too great a sacrifice of substance or when it invades areas which are surgically inaccessible that the surgeon must look for other agents to attain success.

The discovery of x-ray and the isolation of radium have made available a new form of therapy. Early in its history it was found that electro-magnetic radiations of short wave length were noxious to certain tissue cells, particularly those of malignant origin. For a short time this knowledge was a two-edged sword, but painful experience developed such control of this agency that extensive and hitherto untreated areas of malignancy can be successfully attacked. At the present time radiation therapy has progressed to such a point that not only has the field and scope of surgery been greatly enlarged and the operation itself made more effective and safe, but a new and exclusive field for radiation therapy itself has been developed.

As opposed to radium with its very short gamma rays and low energy output effective over relatively short distances, x-ray machines in common use produce radiation of considerably greater wave length, and, likewise, greater energy, making them effective for greater distances. As the intensity of radiation varies inversely as a square of the distance through which it acts, and as the wave length of the radiations produced varies inversely as the voltage, it has seemed that a more desirable agent would result in combining these factors. Consequently, there have been built in recent years several x-ray machines of high voltage, ranging from 400,000 to 900,000 volts. Of these, there are six in this country, two in Germany, one in France, and two in England. While such machines more nearly approximate the ideal of radiation therapy, those producing 200,000 volts are adequate if properly used. The American Society for Control of Cancer, in its effort to standardize therapy equipment and after careful investigation of its various forms, concluded that any equipment producing 200,000 volts was ample in strength and flexibility.

We have, in Minneapolis, available for treatment of private patients, five such deep therapy units in the charge of men trained in their use. Not only is this physical equipment and personnel sufficient to provide proper and adequate radiation treatment, but they are of such number and so disposed that the treatment is well within the means of the average patient.

In recent years the idea has gained ground that cancer is an institutional disease, that it can be treated only in hospitals devoted solely to this purpose and that such institutions are peculiar and unique combinations of men and material. This is probably true in only a limited sense. The development and progress of radiation therapy is well within the memory of most of us and, because it is a new branch of medical science, knowledge concerning it is not widely disseminated. To acquaint ourselves with the present status of x-ray therapy and its recent developments and to satisfy ourselves with regard to the extent and availability of this form of treatment, we have gathered together with us this evening the men responsible and directing this form of treatment in several of the various hospitals of Minneapolis and it is our privilege and pleasure to share with you the results of their experience. I take great pleasure in introducing Dr. Russell Morse.

RADIO-SENSITIVE TUMORS

DR. RUSSELL MORSE: The various species of cells which constitute the body exhibit a different sensitivity to the effects of radiation, whether x-ray or radium. A tumor arising from a certain type of cell will, as a rule, show a sensitivity similar to that of the parent cell.

Those tumors are truly radio-sensitive and may be made to disappear by doses of radiation which produce no demonstrable change in the surrounding and overlying normal tissues.

Very few malignant conditions can be classified as radio-sensitive under the strict use of the term, and they are the myelogenous and lymphocytic leukemias, the lymphoblastomas (whether Hodgkin's disease or lymphosarcoma), the lymphoid type of thymoma, the lymphoepitheliomas of the nasopharynx, and the metastases from embryonic carcinoma of the testicle.

In the treatment of these conditions the distribution and the dosage of radiation depend upon the type of tumor and upon whether it is a local or generalized malignancy.

The thymomas, lymphoepitheliomas, and the metastases from embryonic carcinoma of the testicle should be treated up to the limit of safety at the first course of treatment in the hope of destroying all of the malignant cells.

Occasionally, after a careful search of the body, a lymphoblastoma appears to be limited to a single tumor which may involve one node or a localized group of nodes. This tumor should be treated adequately at the first course of treatment with the hope, usually false, that the malignancy will not make its appearance in other regions of the body.

Most lymphoblastomas are very early a disseminated malignancy and, although the tumor masses can be repeatedly "melted away" by radiation, experience has shown that there is a persistent tendency to recurrence and to the development of new tumors.

Myelomas and lymphocytic leukemias are also to be considered as a malignant process which is widely disseminated throughout the body. The acute lymphatic leukemias usually yield rapidly to radiation of the spleen and bone marrow but the results are only temporary. The chronic lymphocytic leukemias and myelogenous leukemias can be kept under control, sometimes for surprisingly long periods of time, by the use of small amount of radiation of the spleen. Occasionally, however, it is necessary to radiate also the bone marrow in order to secure a satisfactory reduction in the number of leukocytes in the blood and to secure relief of symptoms.

From our present knowledge we believe it is a mistake to treat generalized lymphoblastomas and the leukemias with massive doses of radiation. Our first consideration should be the general health of the patient. We must remember that we are treating an anemic patient with a force which tends to make him more anemic. We should watch the general health of the patient and proceed with the smallest amount of radiation that is necessary to control the disease.

The invariable fatal outcome of the lymphoblastomas and the leukemias should not obscure the really brilliant results we can obtain in preserving the relative good health and activity of the individual afflicted with these conditions. We probably do not even yet know whether we are contributing to a longer life, but we do know that the individual can be kept active and working to within a short time of his death.

Due to the marked sensitivity of the lymphoblastomas and leukemias to radiation, satisfactory results can be obtained by the use of x-rays generated from 135 to 150,000 volts and filtered through 4 to 6 mm. of aluminum. For this reason these malignant conditions can treated satisfactorily in localities where a machine capable of generating 200,000 volts is not obtainable.

Lymphoblastomas involving the root of the lung may simulate closely a primary bronchogenic carcinoma, both in the appearance of the tumor mass and production of atelectasis. It is well to keep this in mind because radiation will assist in the differential diagnosis and may alleviate a serious condition which might mistakenly be considered hopeless.

DR. A. A. ZIEROLD: Due to the confusion that invariably attends the assembling of such a program as this, some mistakes of editing have occurred. The name of Dr. Frank Anderson of Deaconess Hospital has been omitted from this program. Dr. Anderson is the roentgenologist at the Norwegian Deaconess Hospital and has had a considerable experience with deep therapy. I should like this opportunity of asking Dr. Anderson to discuss with you his experience and his estimate of this form of treatment. Dr. Anderson.

DR. FRANK J. ANDERSON: At the Deaconess Hospital we have a machine which is limited to an output of 180,000 volts. This is not considered sufficient for deep therapy and we have not used it in deep seated cancers but we have used it in the treatment of leukemias, Hodgkin's disease, tuberculous lymph nodes, and following amputation in breast carcinomas. During the past twelve years that I have been at this hospital we have had fairly good results in the treatment of the above mentioned conditions. We have not felt that, to date, we have had a sufficient amount of work at our hospital to warrant installing the larger type of machine but may in the comparatively near future.

DR. A. A. ZIEROLD: Dr. Walter Ude has for some years directed the Department of Roentgenology at Eitel Hospital. He has at his disposal one of the high voltage equipments and has had opportunity to treat and observe a variety of malignant diseases. I take great pleasure in presenting Dr. Ude, who will speak to you concerning Roentgen Irradiation of Metastatic Malignancy.

ROENTGEN IRRADIATION OF METASTATIC MALIGNANCY

DR. WALTER H. UDE: The invitation to appear on this program was extended to me as the roentgenologist of Eitel Hospital. This hospital is one of four voluntary hospitals of Minneapolis who are fully equipped to administer deep roentgen irrradiation. It may be of interest to you to know that these four therapy equipments are in actual operation for only a few hours daily, and that their capacity is such that they could take care of from four to six times the amount of work done at the present time. Facilities are therefore available for a marked increase in the amount of x-ray therapy.

The use of x-ray therapy has been gradually extended to include a large variety of conditions of both benign and malignant nature. It is probable that our most satisfactory results are in benign conditions, where a definite objective is usually attained, since these cases are practically all carefully selected. During the past year, 23 per cent of our deep therapy at Eitel Hospital was given for non-malignant conditions, 12 per cent for lymphogranulomata, and 65 per cent for malignant tumors. Carcinoma of the breast, mainly postoperative, accounted for 30 per cent of the entire group, or 45 per cent of the malignancies.

In the treatment of metastatic malignancy, roentgen therapy plays a most important and beneficial part. In many instances it is able to completely destroy skeletal metastases, allowing regeneration of the involved bone and complete restoration of function. In other instances, it may arrest the process sufficiently long to prevent invalidism until metastases to other vital structures lead to a rapid termination of the disease. It may destroy glandular masses to such a degree as to give complete relief from pressure on adjacent organs. In almost all cases it will bring relief from pain.

Metastatic malignancy may be conveniently considered under the following subdivisions: (1) glandular metastases; (2) pulmonary and pleural metastases; (3) liver metastases; (4) brain metastases; and (5) bone metastases. The regional lymph nodes present the first line of defense of the body against the migration of malignant cells, and are therefore the most frequent site of transplants. It is common practice to remove such glands surgically as completely as possible. This should be followed by intensive irradiation in an attempt

to destroy any residual tumor tissue, or to confine it to the involved gland by a firm fibrosis. Where such glands are not resectable, they may often be markedly influenced by irradiation. This is especially marked in the case of metastases from embryonal tumors of the testis, or tumors of similar highly malignant type. Large glandular masses in the retroperitoneal areas can thus be made to completely disappear under intensive therapy. Other more resistant metastases, however, may be influenced very little by such treatment.

Pulmonary and pleural metastases are usually discovered following development of a persistent dry cough, or of signs of pleural effusion. A roentgenogram will usually establish the diagnosis. Pleural fluid should be drained before radiation therapy is administered. The lungs are then treated by direct cross-firing. Temporary benefit usually results in most cases, and in some there may be marked regression of the process.

Metastases to the liver are rarely, if ever, subjected to radiation therapy. They show little, if any, response, and the systemic reaction is so severe that it prohibits this form of treatment.

The clinical diagnosis of involvement of the brain by metastases is based on the development of symptoms of increased intracranial pressure or neurologic signs of localized brain involvement. In a high percentage of cases with brain involvement, this occurs in the terminal stages of the disease. Nevertheless, x-ray therapy may successfully control troublesome symptoms such as headache, vomiting, Jacksonian convulsions, diplopia, and paralysis of cranial nerves. It may thus add greatly to the comfort of the patient and reduce the administration of narcotics. As a palliative measure it may therefore be of great value.

Metastases to bone constitute a most interesting field for radiation therapy. Pain is usually the first symptom of bone involvement, and this is localized at the site of the metastases, but may follow the distribution of adjacent nerves. Occasionally, bony tenderness on direct pressure or percussion may be the earliest finding. When such metastases produce symptoms, they are almost always demonstrable roentgenographically. Rarely is a lesion demonstrated which does not produce symptoms. In a few cases pain may precede the roentgenologic evidence of metastases by several months.

There is considerable variation in the response of bone metastases to radiation therapy. Of the destructive types of metastases, that of hypernephroma is one of the most resistant to irradiation, as is also that of carcinoma of the bladder. The sclerosing or osteoblastic types of metastases of carcinoma of the prostate show practically no structural response to irradiation. It, however, often gives relief from pain and aching Metastases from carcinoma of the cervix, and from the mouth, tongue and lip, may also show rather indifferent response to treatment. Metastases from carcinoma of the breast yield most favorably to irradiation. Relief of pain results within a few days after the first treatment, and most cases show progressive improvement. There is cessation of the destruction, and usually repair by firm new bone formation with complete restoration of function. In a number of cases, sclerosis follows x-ray therapy, so that the end-result resembles the osteoblastic type. Where the metastasis is osteoblastic in character before therapy, irradiation produces increased sclerosis. The clinical improvement is at times most striking. These patients are often restored to a normal life for a period of many months or even several years. Within a few weeks time they may be transformed from almost complete invalidism to a condition where they can temporarily resume their usual activities.

It is in these responsive cases where radiation therapy receives some of its greatest encouragement. The radiotherapist must, of necessity, be an optimist. He must be able to see a ray of hope even in the most severe cases, and consider it well worth the effort to produce relief of symptoms and add a few months of relative comfort to a patient's life, even when at times he knows that the outcome is not in doubt. This is one of his most important services to the cancer patient.

DR. A. A. ZIEROLD: While the time at our disposal this evening does not permit of extended discussion of the various types of malignant diseases, nevertheless, Dr. G. T. Nordin has prepared a brief account of his experience at the Swedish Hospital in the treatment of uterine and prostatic malignancy. As I previously mentioned, Dr. Nordin is the Roentgenologist at the Swedish Hospital and has at his disposal apparatus developing 200,000 volts. I take great pleasure in presenting to you this evening, Dr. G. T. Nordin.

RADIATION THERAPY IN UTERINE AND PROSTATIC MALIGNANCY

DR. G. T. NORDIN: Radiation therapy is only one of the methods at hand for the treatment of malignancy of the cervix uteri. I do feel, however, that it is one of the most important methods, particularly as far as the cervix is concerned.

As early as 1924 Dr. A. W. Crane of Kalamazoo, Michigan, made the prediction that within ten years the problem of cancer of the cervix would be turned over to the radiologist. As you all know, his prediction came true long before the ten years were up. The treatment of malignancy by x-ray is usually spoken of as "deep x-ray therapy." This, I think, is a misnomer, and should be designated as "high voltage therapy," meaning a voltage of not less than 200,000 volts. It is not only necessary that we have the required equipment to work with but it is also necessary that we know where and how to use it, and that we see to it that the patient, as well as the radiological technician, is protected from stray radiation.

The same degree of skill is necessary on the part of the radiologist as that required of a successful surgeon. Errors in judgment on the part of the radiologist may produce serious results the same as in surgery. It is not only necessary that we know how much x-ray radiation to give the lesion but we should also look after the general welfare of the patient. By this I mean that the treatment room must be well ventilated, so as to reduce the amount of liberated ozone in the room to a minimum, otherwise the patient is going to complain of the so-called "radiation sickness." I have found that if the patients are given plenty of water and fruit juices they feel much better. A mild sedative given previous to each treatment also aids considerably in avoiding "radiation sickness."

When I first began to treat malignancy with high voltage x-rays, I gave the entire erythema dose in one treatment, and the patients became very ill. Later, I gave them only one-third of an erythema dose for four days, repeating a similar series from the opposite side. In this way the patients do not become ill during the treatment, and it is my opinion that this way of treating them is more effective than the former.

The type of filter used is of importance. If too thick a filter is used, much of the effective radiation is lost. This increases the time, the discomfort of the patient, and the wear and tear of equipment. Lately I have used the composite filter, containing sheets of tin, copper, and aluminum. This type of filter absorbs all of the soft radiation, and leaves most of the effective radiation intact. The usual distance of the x-ray tube from the skin of the patient is about fifty centimeters, unless for some reason this is impracticable. The percentage increase in deep radiation where a greater focal-skin distance is used, is so slight that it is almost negligible and the time is very much longer.

It is almost impossible to consider radiation therapy of malignancy of the uterus without including radium.

I have a chart showing diagrammatically the distribution of the two energies in the pelvis of the treated individual. You will notice that the two energies complement one another very well. One obtains the maximum amount of radiation at the site of the tumor without endangering the surrounding structures, as the bladder and the rectum, and yet enough radiation to the adnexal region to be effective. The amount of radium to be used depends upon the size of the patient and the size of the tumor. The larger the patient and the larger the size of the mass of the tumor, the larger the dose. This may vary from 1,000 to 4,000 milligram hours of heavily filtered radium. I am not going into the details of the applications of this energy, as this, I understand, will be covered in another paper.

It is very important that the maximum amount of radiation be given the first time the patient is treated, because the malignant cells, at this time, are usually more sensitive to radiation than they will be later on. It is, therefore, very evident that the success of the radiation treatment depends to a great extent upon the first radiation dose. We must naturally guard ourselves against giving too much so as to do irreparable damage to the surrounding structures. It is almost as bad to give too little, because the growth of the cells would be attenuated for only a short time, and they would grow even faster later on.

When one examines the patient two months after a complete radiation of this kind, one is often very much surprised at the complete disappearance of the tumor mass and the normal appearance and feel of the structures. Although it seems that all of the malignancy has been disposed of, if these tissues were carefully examined microscopically, one would find nests of cancer cells surrounded by connective tissue. If the surgeon would step in at this time to clean out what was left from the radiation treatment and prevent the reactivation and the further spread of these cells, we would be doing more for our patients. The closest cooperation between the surgeon and the radiologist is bound to produce the best results, and until then we are going to get nowhere with the cancer problem.

The problem, so far as cancer of the prostate is concerned, is considerably easier, because of the fact that the gland lies much closer to the surface, both to the anterior and to the perineal surface. In these cases I give one erythema dose from the front, the back, and the perineum. In this way I can deliver about a hundred and fifteen per cent of an erythema dose to the prostatic region. It has been very gratifying to note the relief that the patients receive from the x-ray treatment. Most of these patients come in because of pain and retention, and, many times, before the patient finishes the series the pain has been relieved and the retention has been markedly lessened. To be sure, many of the patients complain of almost complete obstruction during the course of the treatment and have to be catheterized. This, however, does not last very long because shortly the size of the gland begins to diminish and the patient is able to pass his urine. Occasionally one finds a very radio-sensitive carcinoma of the prostate that literally melts away. I am sorry to say that this is the exception rather than the rule.

The patients I have taken care of during the past ten or twelve years have been operated upon after the first or second series of x-ray treatment, the operation consisting of the removal of sufficient amount of tissue along the course of the urethra to completely relieve any tendency toward obstruction. During the last year or two this operation has been done by means of the endotherm-knife or the endotherm-loop. During the past year we have tried to insert radium by catheter into the prostatic portion of the urethra following a course of high voltage therapy. As far as we can tell at the present time, this, apparently, is going to work out well, although sufficient time has not elapsed to express a definite opinion. The value of high voltage therapy in metastasis from the prostate is well known; however, this will be covered in another paper.

DR. A. A. ZIEROLD: In every community there are some few individuals who require no introduction. There is little that I can tell you concerning the next speaker which you do not already know. Dr. Allison has, for a number of years, concerned himself not only with the broad field of roentgenology but with the more specialized field of deep therapy. I am sure that from the breadth of his experience his remarks this evening should prove interesting and valuable. I take great pleasure in introducing Dr. R. G. Allison, who will speak to you concerning "Radiation Treatment in Carcinoma of the Breast."

RADIATION TREATMENT IN CARCINOMA OF THE BREAST

DR. R. G. ALLISON: The radiation treatment which is being employed at present in this locality in carcinoma of the breast consists primarily of postoperative radiation. Our routine at present is as follows:

The patient is referred to us by the surgeon shortly after the breast amputation has been done. If possible, we start our treatments about ten days after the amputation has occurred. Radiation given at this time has no deterrent effect on the healing of the wound. Our treatment consists of x-ray applied over three fields and is usually completed within four or five days. The factors which we use are: 200 K.V.—30 Ma. at 50 cm. distance and with ¾ mm. copper and 3 mm. aluminum filter. An erythyma dose can be given over each area at this setting in fifteen minutes.

As I have said, the greater part of our therapy is postoperative therapy. The fact that this is administered postoperatively is not by our choice. We rarely see a patient with carcinoma of the breast before operation. This is, I think, due mainly to the attitude of the surgeons who feel that any time elapsing between diagnosis and the operation in cases of carcinoma of the breast is time wasted or worse. They have this feeling because they believe that delay will simply be time in which metastasis may occur. This feeling is perfectly natural and is based on a lack of knowledge of what can be accomplished by radiation. Frequently, also, I believe we see patients after operation who are sent to us because the surgeon feels that radiation will do no harm and may possibly do some good. In other words, postoperative radiation is often given merely to assure the patient that everything is being done.

There is no dispute that radiation has a known and proven value in carcinoma in locations other than in the breast, notably the cervix of the uterus. There are still those who maintain that radiation is of no proven value in carcinoma of the breast. However, we have all seen these same individuals refer inoperable or recurrent cases of carcinoma of the breast for radiation and invariably they admit that such cases are benefited by the radiation.

Dr. Bloodgood, in a recent publication, tells of his experience with a patient suffering from carcinoma of the breast. The patient was suffering from an apparently inoperable carcinoma of the right breast with advanced involvement of the breast but without palpable axillary glands. There were no demonstrable metastases. The patient, sixty-five years of age, was feeble, and a poor operative risk. Radiation was administered and nothing else was done for a period of three months thereafter. The general condition of the patient was not affected by the radiation. At the end of the three months Dr. Bloodgood performed, with the electric cautery, a chest-wall excision of the breast, the lower portion of the pectoralis major and a large area of skin. The periphery of the tissues removed showed no evidence of carcinoma grossly and since no glands were palpable in the axilla a radical operation was not performed. More than a year has elapsed

since the operation and the patient is still living with no evidence of carcinoma and is as well as she was preceding the x-ray and surgical procedures. The tissues removed at the operation, when studied microscopically, were very illuminating. In that portion of the tumor which had received the greatest amount of radiation a new type of connective tissue was discovered. This connective tissue differed from normal breast structure and also showed no evidence of carcinoma. In the area surrounding this zone numerous cancer cells were found. These cancer cells were only distinguishable by their outlines, as the cellular structure took no stain. In the tissue which had received the smallest amount of radiation nests of cancer cells were discovered. These cancer cells differed in no particular from those in cancer of the breast that had not been exposed to radiation. This case demonstrates very definitely the value of radiation. To my knowledge this case is the only one in which tissues have been obtained at such a length of time following gradiation. In the average case which is treated preoperatively, a radical resection is done about ten days following the treatment. This length of time is insufficient to allow for structural changes to occur in the tumor and the morphological characteristics of the cancer cells have not been sufficiently changed to allow conclusions to be drawn.

Carcinoma of the breast, no matter what type of treatment it receives, presents a gloomy picture. Statistics on this subject vary widely, but large numbers of series of such cases show that when treated by operation alone about 70 per cent of all patients coming to operation die within five years. The majority of the remaining 30 per cent die ultimately from cancer.

Dr. Portmann of the Cleveland Clinic has recently presented a series of cases, consisting of 103 consecutive cases in which operation and radiation were combined in treatment. He divided his cases into three major groups as follows:

Group I—Cases in which the tumor was limited strictly to the breast and the patients were free from involvement of the axilla as reported by the pathologist.

Group II—Cases with axillary and slight skin involvement, but with the tumors still movable.

Group III—Cases more advanced but still considered by the surgeon to be operable.

In his series in Group I, 77.6 per cent of the patients were free from cancer at the end of five years. In Group II, 61 per cent lived for five or more years and 56.3 per cent were free from cancer at the end of five years. However, of those in Group III, 84.4 per cent died of cancer and only 18.7 per cent lived for five years. When all cases are considered as one group he found that 50.5 per cent lived five years or more and that 42.7 per cent were free from disease for five years or more.

Cases of carcinoma of the breast treated by radiation alone are as yet not numerous. However, numerous cases are on record of inoperable carcinoma of the breast which has been treated by radiation alone with good results. To date, little of value has been published regarding such cases. This is true because practically all such cases have been treated and observed without biopsy. Without biopsy such a case is of no value for statistical purposes. Individual experience has shown, however, that treatment of carcinoma of the breast by radiation alone is of distinct value.

A recent bulletin from the New York State Institute for The Study of Malignant Diseases states, "Radiation and conservative operation were also practiced * * * with some astonishing results * * * and with marked improvement in the lesions. Noteworthy was the effect in two women who were pregnant and had large malignant tumors in their breasts which completely disappeared by this method of treatment."

Dr. Douglas Quick of New York has followed an operable carcinoma of the breast treated by radiation alone, for well over fourteen years. In this patient the tumor was 2.5x3.5 cm. in diameter and there was a questionable node in the axilla. The tumor regressed rapidly at first and then more slowly. After three years there was a dense residual mass in the breast and telangiectasis of the overlying skin. The condition has not changed since that time.

The majority of authorities feel that biopsy can safely follow intensive radiation after an interval of two weeks. With this knowledge available it should only be a short time until statistics on the value of treatment by radiation alone will have reached a stage at which conclusions may be drawn as to the relative merits of the various types of treatment.

With the realization that treatment of carcinoma of the breast is as yet far from satisfactory it seems that every effort should be extended towards improving the results obtainable. Knowing the value of radiation in carcinoma in general it seems only logical that pre-operative as well as post-operative radiation should be a routine in the treatment of carcinoma of the breast. Such treatment slows growth in the primary tumor and brings about a regressive and degenerative effect on the tumor bed as well as on the tumor cell. A certain number of deaths following operation are due to dissemination of the tumor cells at the time of the operation. Postoperative radiation does not get at these cells because they are outside the field of radiation. Pre-operative radiation will reduce this type of dissemination. Operation should be deferred until six or eight weeks after the pre-operative radiation is completed. Pre-operative radiation must be by means of x-ray. The application of radium is impractical and the implantation of radium is contra-indicated. It must be remembered that inoperable carcinoma of the breast cannot be rendered operable by radiation. The more spectacular the regression, the more malignant the tumor and, hence, the more dangerous is surgery.

(To be continued)

PHENOLPHTHALEIN AS A "PATENT MEDICINE"

Phenolphthalein was introduced into medicine as a laxative about thirty years ago, following the observation that certain of the cheaper Hungarian wines to which it had been added took on an actively laxative effect. Phenolphthalein is an odorless and almost tasteless powder, very slightly soluble in water. From the fact that it is nearly tasteless and is active in small doses, it is especially well adapted for the production of what have been called candy medicaments. Among its disadvantages is a degree of variability in action, small doses sometimes acting excessively, when at other times a larger dose will fail to act. It may cause, in addition to purgation, colic, rapid pulse, difficult breathing, and even collapse. There may be no serious objection to a physician's prescribing phenolphthalein in candy form for a child, because the very conditions that surround the issuance and the use of a prescription are such as to make it highly improbable that the dosage recommended will be exceeded. It is an entirely different thing, however, to put up an active drug in the enticing form of candy or chewing gum, sell it indiscriminately to the public for self-medication, and advertise it in newspapers and over the radio by the ballyhoo methods common to "patent medicine" exploiters. It is a well-known fact that the public has a general idea that products sold as "patent medicines" are, broadly speaking, harmless. They have a feeling that the state would not permit the indiscriminate sale to the public of drugs that were really dangerous. How far this is from the truth, every physician knows, but the fallacy persists. The fact is, there is no legitimate excuse for putting up potent drugs in the enticing form of confections and selling them indiscriminately to the public.—(*Jour. A. M. A.*, April 29, 1933, p. 1358.)

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of inetrest to physicians.

Books Received for Review

SURGERY OF A GENERAL PRACTICE. A. E. Hertzler, M.D., Chief Surgeon, Halstead Hospital, and Victor E. Chesky, M.D., Chief Resident Surgeon, Halstead Hospital. 602 pages. Illus. Price, cloth, $10.00. Saint Louis: C. V. Mosby Company, 1934.

SPINAL ANESTHESIA. George Rudolph Vehrs, M.D., of Salem, Oregon. 269 pages. Illus. Price: cloth, $5.50. Saint Louis: C. V. Mosby Company, 1934.

MODERN DRUG ENCYCLOPEDIA AND THERAPEUTIC GUIDE. Jacob Gutman, M.D., Phar.D., F.A.C.P. 1393 pages. Price $7.50. New York: Paul B. Hoeber, 1934.

This is an index of a large number of non-pharmacopeal, medicinal preparations, drugs, chemicals, biologicals, foods, mineral waters, allergens and miscellaneous products. These substances are listed together with the manufacturer's name, and under each is given a brief description, its action, uses, sources and method of administration. A bibliography is supplied and an extensive index. The book is of value for reference purposes.

T. A. PEPPARD, M.D.

DISEASES OF THE SKIN. 4th edition. Oliver S. Ormsby, M.D., 1288 pages. Illus. Price $11.50. Philadelphia: Lea and Febiger, 1934.

The fourth edition of Dr. Ormsby's well known book is, as usual, an improvement upon its predecessors. Thirty-six new diseases have been added and, as a result, it is almost impossible to find any skin disease that is not mentioned. This is a valuable asset.

The illustrations are numerous and good. The book is very well written and is of the utmost value to anyone interested in dermatology.

The bibliography is especially fine and will be a great help to anyone wishing to look up the literature on any cutaneous disease, as the key articles are all given and This is an excellent book and can be recommended.

S. E. SWEITZER, M.D.

DIET IN SINUS INFECTIONS AND COLDS. Egon V. Ullmann, M.D. 166 pages. Illus. Price, $2.00. New York: The MacMillan Co., 1933.

The subject of diet in sinus infections is a timely one and Dr. Egon V. Ullmann has given us a book of real value in his treatise on this subject. I would recommend this book as worthy of study not only by specialists in eye, ear, nose and throat, but by all physicians as well.

A few of the points to which he calls attention are the following:

Every other person believes he suffers from sinus trouble. Many of these sufferers are not primarily sick in the nasal sinuses but the nasal mucous membrane simply represents the location where abnormal reactions manifest themselves. Effects which various foods have on the system are discussed; also the effect where the diet is principally meat alone or fruits or vegetables alone. The need of salt-free diet in some cases is also brought out as well as the need of alkaline producing foods in others.

All patients with colds and sinus infection show signs of marked acidosis, such as shortness of breath and inability to hold their breath after deep inspiration longer than twenty to twenty-five seconds.

With increased acidity the breathing becomes faster from the carbonic acid in the blood acting on the respiratory center. In directing the method of living and diet of these patients, most of them can be kept free from colds.

Wrong food given with an abundance of vitamins will lead to chronic diseases. Meat broth has stimulating effect on the nervous system with practically no food value.

Citrus fruits with acid taste have alkaline effect in the body; meats and bread, with neutral taste, have an acid effect.

Food alone will not bring about a cure if not aided by general hygiene.

ELWYN R. BRAY, M.D.

MENTAL HYGIENE IN THE COMMUNITY. Clara Bassett. 394 pages. Price, $3.50. New York: MacMillan Co., 1934.

The author states the purpose of the book is to present a panoramic sketch of the various ways in which mental hygiene may be of importance and value and to indicate the places in the present organization of community life where it may possibly function with profit.

The book satisfies the author's purpose. Each chapter contains an instructive and interesting discussion of mental hygiene in relation to a particular department of community life, including medicine, nursing, social service agencies, delinquency and law, parental education and so on. Suggestions for the investigation of the department complete each chapter. The book is worth one's study.

ROYAL C. GRAY, M.D.

NEW AND NON-OFFICIAL REMEDIES, 1934, containing descriptions of the articles which stood accepted by the Council on Pharmacy and Chemistry of the American Medical Association on Jan. 1, 1934. Cloth. Price, Postpaid, $1.50. Pp. 510; lx. Chicago: American Medical Association.

New and Non-official Remedies, 1934, has the same pleasing format and helpful mechanism that has characterized it in past years. The enrichment of the indexing started a few years ago is continued and its value even increased by some desirable simplification of cross references.

The Council has made the usual careful revision of the book. The general article Lactic Acid-Producing Organisms and Preparations has been practically rewritten. The chapter on Arsenic preparations has undergone some revision, especially in the statement concerning Neoarsphenamine. The descriptions of Chiniofon and Vioform have been revised in the light of recent developments in the treatment of amebiasis. The article on Ethylhydrocupreine has been revised to delete references to Optochin Base, which has been omitted; Optochin Hydrochloride has been retained, being recommended only for external use. The description of Typhoid Vaccine has been revised to give the dosage of the combination of typhoid and paratyphoid organisms and to mention the use of typhoid vaccine in nonspecific protein therapy. A number of revisions of the Council's Rules have been made, particularly with reference to the names of products, which is one of the most frequent and troublesome of the problems with which the Council has to deal. Comparison with last

year's volume will show that revisions of more or less importance occur in many other chapters.

Among the preparations newly included in this volume are: Aminophylline, a double salt or mixture of theophylline and ethylenediamine, with the advantage of greater solubility over other theophylline preparations; the new alum precipitated diphtheria toxoid; Neo-Iopax, a new medium for intravenous urography; Benzedrine, an ephedrine substitute; serums containing type II pneumococcus antibodies, which the Council has recently recognized as worthy of clinical trial in view of improved preparations and technic; Autolyzed Liver Concentrate and Extralin, two new liver preparations for use in the treatment of pernicious anemia; Metycaine, a new local anesthetic; and Sodium Morrhuate, a salt of the fatty acids of cod liver oil, proposed for use as a sclerosing agent.

ANNUAL REPRINT OF THE REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR 1933. Cloth. Price, Postpaid, $1.00. Pp. 188. Chicago: American Medical Association.

The main bulk of volume, which is, incidentally, considerably increased over that of recent annual volumes, is taken up with reports on products which the Council has found unacceptable for inclusion in New and Non-official Remedies. Of special note are: The report on Alpha-Lobelin, a drug upon which the Council in 1927 issued a preliminary report but which is now found not to have established itself as a respiratory stimulant of as great usefulness as carbon dioxide and oxygen; the report on a number of preparations marketed by the Upjohn Company with unwarranted, misleading and unscientific claims; the report on Clavipurin, a preparation of the alkaloids of ergot, marketed without adequate declaration of the composition and without adequate standardization under a nondescriptive proprietary name with unwarranted therapeutic claims; the report on Diampsal, another pyridine derivative proposed for use in bacterial infections, convincing evidence for the therapeutic value of which is lacking; the report on Euphydigital, an irrational mixture of digitalis and a theophylline preparation marketed under an uninforming, proprietary name, with exaggerated and unwarranted claims for its therapeutic value; the report on Guphen, stated to be the guaiacol ester of phenylcinchoninic acid, marketed with unwarranted therapeutic claims under an uninforming, proprietary name and having no proved advantage over its constituents administered separately; the report on Niazo, a pyridine compound of unsubstantiated value as a urinary antiseptic; the report on Omnadin, a preparation recognized for use for nonspecific lipoprotein therapy practically as a cure-all; and the report on a group of endocrine preparations of the Rovin Laboratories variously unacceptable as being of indefinite composition and of undemonstrated therapeutic value.

A feature of marked current interest in this volume is the preliminary report on Alpha-Dinitrophenol, the new drug for acceleration of cellular metabolism. The Council voices a warning on the dangers attending the use of this drug; this warning has been increasingly justified in reports of fatalities since the appearance of the Council's report in July of last year. Other preliminary reports which make this volume one of the most interesting issued by the Council in recent years are those on Dilaudid, a new narcotic drug related to morphine; Fuadin, a new antimony compound for use in the treatment of bilharziasis and granuloma inguinale; and Hippuran, a new product for intravenous and oral urography. The comprehensive and definitive special report on estrogenic substances furnishes a much needed review of the present status of such products in gynecologic therapy. The Council insists upon the doctrine that basic laboratory investigation of these substances should precede clinical use. Of interest to hospital authorities, especially in connection with the book Hospital Practice for Interns recently issued by the Council in collaboration with the Council on Medical Education and Hospitals, is the special report, The Hospital Formulary, by Hatcher and Stainsby of New York. It outlines a plan characterized by the highest regard for the principles of rational drug therapy. Of more general interest is the Council's second report on the intravenous use of barbital compounds which is the result of a questionnaire sent to representative physicians. In view of the answers to the questionnaire, the Council reaffirmed its previous decision concerning the limitations of intravenous use of barbital compounds; namely, that these preparations should be administered intravenously only in a limited number of conditions in which administration by other routes is not feasible. The report carefully details these conditions. The lengthy report on the omission of Pyridium is an outstanding example of the meticulous fairness characteristic of the Council's treatment of the manufacturers of commercial preparations. In connection with the omission of Pyridium should be noted the report which declares Azophene (Mallophene) not acceptable. This product has been shown to be identical with Pyridium and the Council considers the claims for its usefulness as a local, general, or urinary antiseptic as unwarranted, as are those for Pyridium.

THOUGHTS OF A DOCTOR ON THE FIRST NIGHT OF HIS MUCH NEEDED VACATION

This night I sleep!
I lay me down upon this bed.
Dame Morpheus be my guest,
And give me thy caresses!
I put my pillow 'neath my head.
I sleep!

This night I sleep!
The whole darn world can go to pot.
I've checked out for the hour.
No frightened dame back home
Can call and ask *me* what she's got.
I sleep!

This night I sleep!
Tonight I'm going to get some rest.
This 'phone won't ring tonight
And wake me with a start
To answer to a friend's behest.
I sleep!

This night I sleep!
No knock can sound upon my door
And rouse me from my slumber.
No one can harm my rest
By waking me at half-past four.
I sleep!

This night I sleep!
No premonitions now can fill
My troubled mortal soul
Of an urgent call to go
To a farm by a marsh by a far off hill.
I sleep!

This night I sleep!
I need not answer to the call
Of someone's wife in labor.
Ah! pillow hold my head!
My competitors can have it all!
I sleep!!

L. J. ALGER, M.D.